The Bankslanders: Economy and Ecology of a Frontier Trapping Community

Volume 2 — Economy and Ecology

By Peter J. Usher

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THE BANKSLANDERS:

ECONOMY AND ECOLOGY OF A

FRONTIER TRAPPING COMMUNITY

VOLUME 2 – ECONOMY & ECOLOGY

by

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ABSTRACT

Fur trapping, for generations the chief source of income for native people in northern Canada, has seriously declined in recent years. An outstanding exception is the community of Sachs Harbour, Banks Island, N.W.T., where several thousand arctic fox pelts are harvested annually by fifteen to twenty trappers.

This study analyzes three topics: the cultural ecology of the colonization of Banks Island as a trapping frontier, the economic geography of trapping and hunting there, and the current status and future prospects of the community of Sachs Harbour. Its purposes are to investigate the ecologic, economic and social basis of trapping, to understand trapping as an adaptive strategy in particular historical circumstances, and to analyze it as a viable resource system.

Volume Two

The ecology of the arctic fox on Banks Island is discussed, and a means of measuring areal exploitation in trapping is devised. The relationship between effort inputs and trapping success is examined. The number of trap checks is the input factor most strongly correlated with the number of foxes caught, with the number of traps set showing the second best correlation. Tentative predictor equations for trapping success are derived for various levels of fox abundance within the population cycle, and for the cycle as a whole.

Quantitative analyses of seal, caribou, polar bear and other types of hunting show how these activities are integrated with the total resource system, and provide data for comparison with other Arctic regions.

Methods are developed for the calculation of production costs of fur pelts and animal foods (and hence the profitability of trapping and hunting), as well as for the calculation of income in kind. The discussion includes the role of marketing, credit and savings.

PREFACE

This report is the second of a three volume study of the fur trapping community on Banks Island, N.W.T. Although each volume concerns a separate aspect of the community, there is a unity to the series, and I have included a general introduction in Volume One, and a general conclusion in Volume Three. Readers interested in only one aspect, however, will find that each volume may be read as a separate monograph.

Peter J. Usher
Ottawa, February, 1971

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CHAPTER ONE

FOX TRAPPING

The arctic fox on Banks Island

The chief fur bearer on Banks Island is the arctic fox *(Alopex lagopus).* As in most other parts of the circumpolar region, the white phase predominates;[1] indeed, the blue phase accounts for less than one per cent of the Banks Island catch. Red foxes *(Vulpes vulpes),* which are rare on the Arctic Islands, are obtained very infrequently. Ermine *(Mustela erminea)* are common to Banks Island, and are occasionally taken in the traps. Since these other species customarily account for about one tenth of one per cent of the catch, the present discussion is restricted to the arctic fox.

Our knowledge of the biology and behaviour of the arctic fox on Banks Island is quite limited. The only study of foxes on the Island was made by McEwen in 1955. Much has been written on the arctic fox in other areas, particularly the Soviet Union, but one cannot assume that observations in other areas apply to Banks Island with the same force. Most of the Canadian work on arctic fox biology has been done by A.H. Macpherson, although others such as Butler, Dymond and the Chittys have analysed fox population dynamics, largely on the basis of fur harvest statistics. Most of the literature is concerned with denning, feeding, reproductive behaviour and the question of cyclic abundance. However, the arctic fox is a very peripatetic animal, and there is a great deficiency of information about the range, timing and cause of their movements.

Basically, it is known that Banks Island is capable of yielding very high fox catches, and that these catches fluctuate very markedly from one year to another. The very best trapping seasons on the Island have produced harvests of 7,000 to over 11,000 foxes, including those subsequently lost or destroyed in traps. Such harvests compare favourably with the returns from other parts of the Arctic, and are remarkable in view of the small number of trappers involved. It is true that these trappers have expended more than the usual effort to obtain foxes. Every year, thousands of traps are set along hundreds of miles of traplines over an area of as much as 10,000 square miles. Despite the fact that this effort varies only to a minor degree, the catch can vary by a factor of up to ten, even on a per trapper basis (Figure 1.1). Nine maxima appear to have occurred on Banks Island between 1929 and 1966, having a mean interval of 4.1 years, and a range of two to six years.[2]

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[1] Hence the popular term "white fox", which is used locally and in the fur trade. That name is used throughout the rest of this study and includes both the white and blue phase. However in this section, which is primarily a biological account, the term "arctic fox" is used.

[2] The choice of cycle peaks is somewhat arbitrary. Because the number of trappers on Banks Island varied so much from year to year, the per trapper catch rather than the total catch is used to measure relative abundance. By the strict definition of a peak (a year in which the catch is greater than in either the preceding or following years), there have been twelve peaks since 1928. Not all these peaks are significant, however, as for various reasons trapper effort and the fraction caught differ from year to year. I have used only those seasons which trappers generally agree were ones of unusual fox abundance on the Island: 1929-30, 1933-34, 1938-39, 1940-41, 1946-47, 1951-52, 1954-55, 1957-58, 1960-61, and 1966-67. This method of choosing maxima is in conformity with Butler's usage (1953:245).

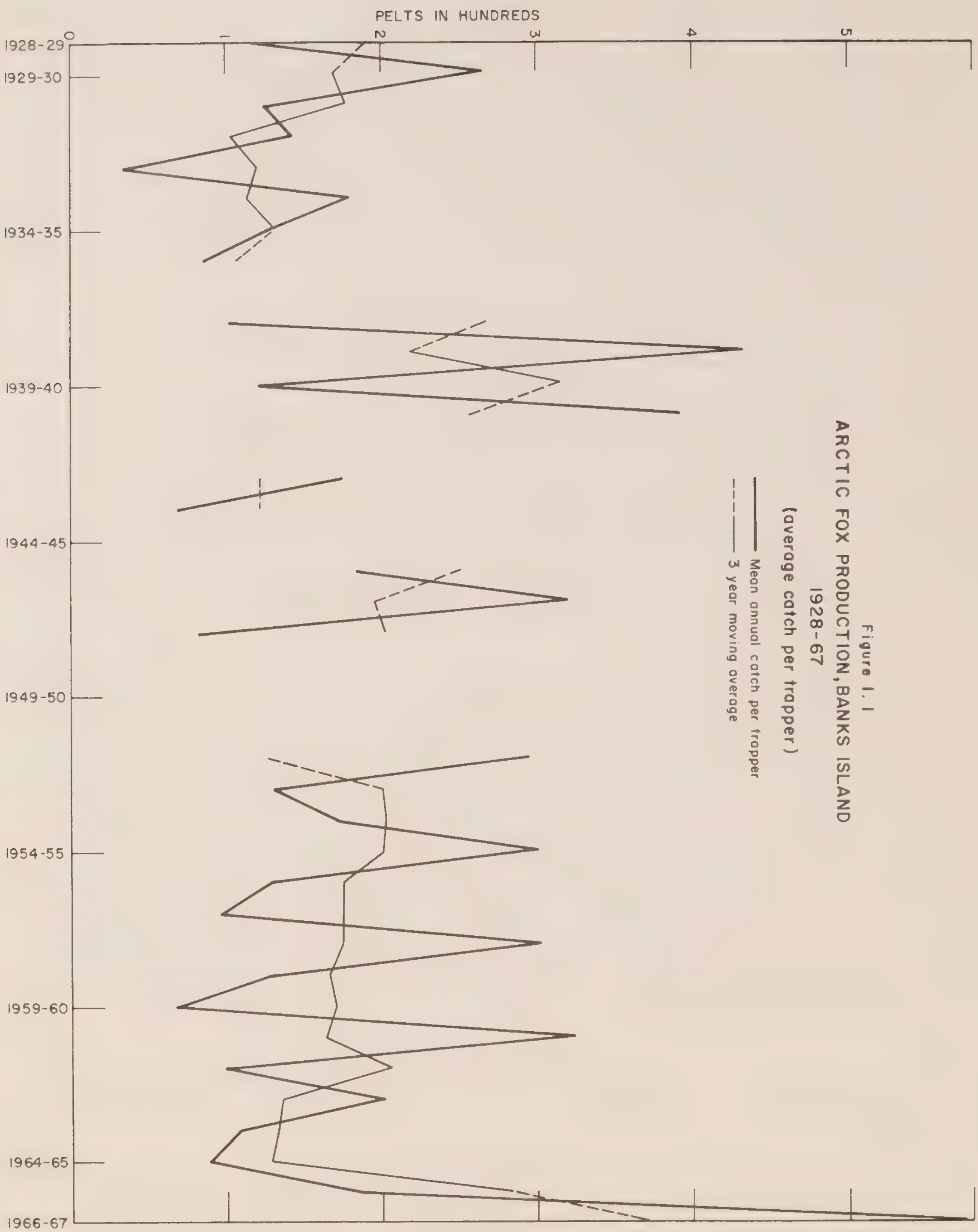

Figure 1.1
ARCTIC FOX PRODUCTION, BANKS ISLAND
1928-67
(average catch per trapper)

Such fluctuations are not peculiar to Banks Island but have been observed among most populations of arctic fox. They are popularly referred to as cycles, but a definite and regular periodicity is seldom evident in the harvest data.

These maxima are sometimes synchronous, or nearly so, over large areas (viz. Chitty, 1950). For example, Figure 1.2 suggests a close relationship between fox maxima and minima on Banks Island and those on western Victoria Island. The determinants of fox, or more particularly lemming abundance would appear to be in near simultaneous operation over this large area. The relationship between fox and learning populations is intricate, but unfortunately there is very little information on it, especially for Banks Island.

It is also evident that the abundance of foxes, or at least the frequency with which they are trapped, fluctuates during the trapping season, and that this variation may be a function of the total abundance of foxes in the season in question. Data were obtained for the distribution of the annual catch by month for the years 1964-68 (Figure 1.3). In each year except for the extremely poor season of 1964-65, about twenty per cent of the foxes were taken on the first trip.[1] This is particularly significant because, as the men are setting their traps on the way out, the lines are being checked only once, on the return voyage, and only a few days after the traps were first opened. For the two average or slightly below average years of 1965-66 and 1967-68, there was a decline in December, although in the peak year of 1966-67, the catch was highest in this month, and subsequently declined.[2] There was a slight surge in the catch in January of 1965 and 1966, but common to all years was the low catch in February and the subsequent rise through March and especially in the last two weeks of the season.[3] Particularly interesting was the inverse relationship of fox abundance and the proportion taken in spring. In the very poor year of 1964-65, and to a lesser extent in the mediocre season of 1967-68, most of the harvest was taken at that season,[4] whereas the spring catch in 1967, although large in numbers, was not a significant proportion of the total season's take.

Habitat

Banks Island provides excellent habitat for arctic foxes; in particular, suitable terrain for denning, an abundance and variety of food, and few predators and competitors.

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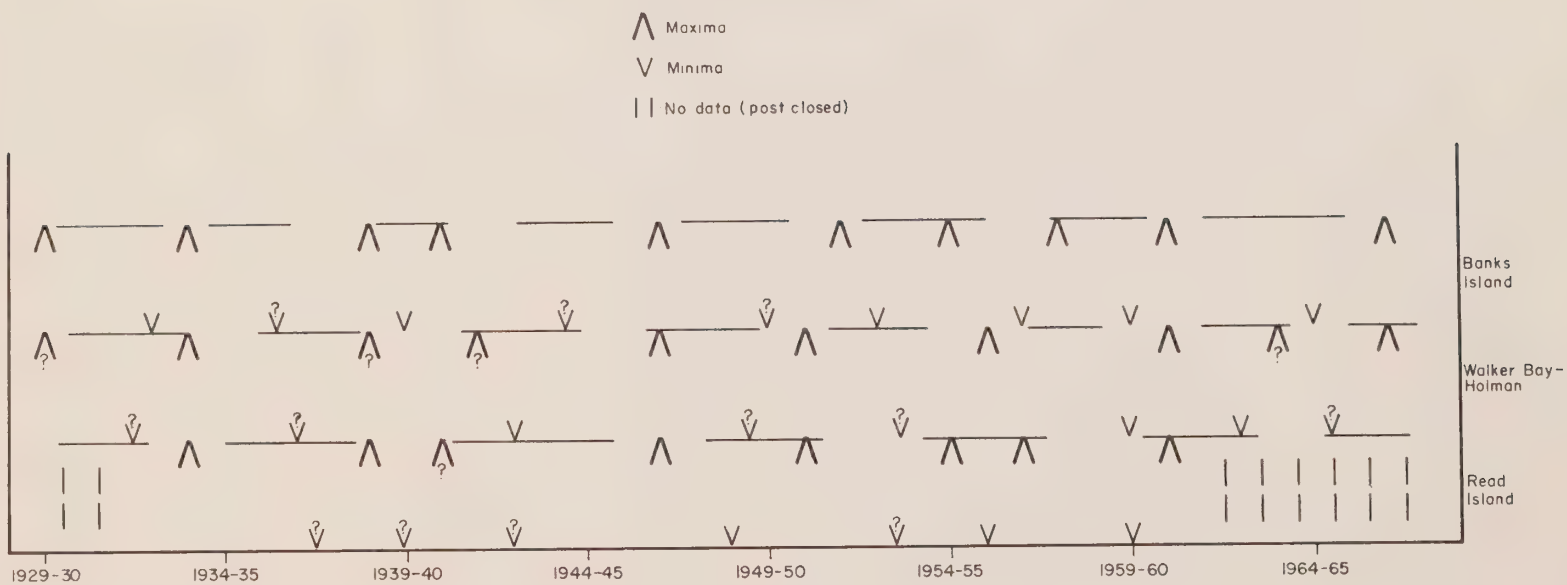
[1] The poor November catch in 1964 may be due to the late start many trappers made, since most had to stay in the settlement to participate in an air-lift of supplies from the mainland, as the annual supply vessel had been unable to reach the Island the previous summer due to ice conditions.

[2] A similar pattern for the peak year of 1951-52 on Banks Island is described by McEwen (1952).

[3] Preliminary analysis of 1968-69 and 1969-70 returns show very similar trends. The former was below average, the latter nearly average in terms of the per trapper catch. Both of these seasons were almost identical in pattern, with just under twenty per cent of the catch being taken in November, declining to ten per cent in February, and rising again in spring, with the increment in April over March being slightly higher in 1970 than in 1969. In both years, 25 per cent or more of the catch was taken in April.

[4] This pattern was also noted by Macpherson (1960:13) on Banks Island for the poor year of 1958-59.

Figure 1.2
WHITE FOX MAXIMA AND MINIMA
WESTERN ARCTIC, 1929-68

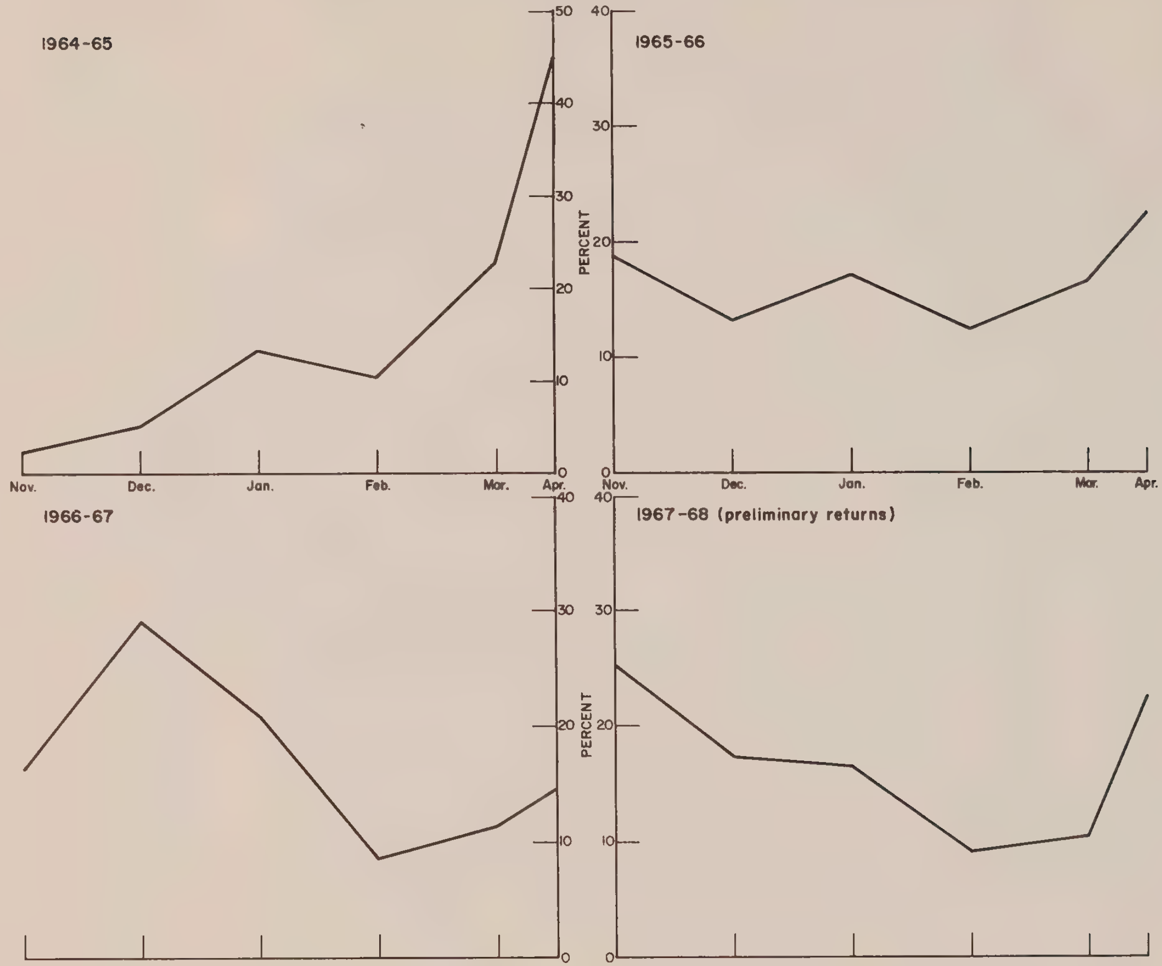


A question mark indicates uncertainty in the year of occurrence or uncertainty that a true maximum or minimum occurred. A symbol placed between two years indicates the event may have occurred in either year.

Mainland returns west of Coppermine are very low throughout this period and are frequently confused by the sale of Banksland furs at these points. The identification of cycles on the mainland is therefore difficult although the data suggest a close relationship with the Islands.

Figure 1.3

PERCENTAGE DISTRIBUTION OF THE ANNUAL FUR HARVEST BY MONTH
BANKS ISLAND, 1964-68



Observations by Canadian and Russian biologists (viz. Macpherson, 1969; Danilov, 1961; Dementyeff, 1958; Sdobnikov, 1968; Tchirkova, 1958a) indicate that arctic foxes den in sandy, well drained, vegetated areas, particularly in stream banks and valley sides, preferably with southern exposure and an adequate water supply nearby. Unstable soils characterized by sorting and solifluction are avoided for denning, whereas hummocky ground with dryas or lichens, or grassy knolls are frequently ideal. Such conditions are wide spread in the lowlands of western and central Banks Island, and it is possible that the area supports one of the densest populations of arctic fox in the North American Arctic.

Fyles has divided Banks Island into five physiographic regions (See Figure 1.4), the largest being "... a low plain of gently rolling hills, shallow valleys, and alluvial flats and benches ..." (1962:12). This surface, amounting to about sixty per cent of the area of the Island, consists of gravel and sands which in the main do not appear to have been glaciated during Wisconsin times. The overburden is frequently tens of feet thick, and inland it is dissected by a dendritic pattern of small streams. The 200 foot contour line lies 10 to 15 miles from the coast, and only in the southern part of this region are there large areas above 500 feet. The chief landmarks of this otherwise rather featureless landscape are the valleys of the four major rivers which drain the region. All but one rise in the hilly morainal belt near the east coast and flow north or northwest, then west, across the lowland to the Beaufort Sea. The lower thirty to fifty miles of the valleys are broad and flat, and the rivers themselves become braided. (The Masik River, although smaller, and draining a dissected upland, has similar characteristics). Away from the immediate braided channels the flats are grassy, and near the mouths contain myriads of small tundra ponds. Where the ground begins to slope away from the valley floors, it tends to form hummocks. The interfluves are frequently characterized by smooth, gravelly surfaces with a minimum of vegetation. Small knolls perhaps five to twenty feet in diameter are common features of many flat or gently sloping surfaces, except in sedge flats. Peaty areas and polygonal ground formations occur in some of the major river valleys but tend to be quite restricted. Although there are spectacular examples of patterned ground of various types on the Island, they are not widespread, and in the main the land surfaces are relatively stable.

The lowland thus provides ideal habitat both for foxes and for their chief prey, lemmings. Such conditions occur sporadically in other physiographic areas; for example in the Masik valley and probably the lower Thomsen River and Mercy Bay areas, which are part of higher and more deeply dissected regions in the north and south. In general, however, these other major regions do not appear to provide as suitable denning grounds, and are not as productive for trapping. The trappers themselves very soon learned that the lowland province offered both fox abundance and ease of travel. Almost ninety per cent of the current (1961-67) trapping area, and virtually all of the intensively used area, lie within this province. It will be recalled (Volume One, Chapter Three) that the east side camps, whose immediate hinterland was the morainal belt, did not provide a good living; indeed the few trappers who did well at these locations generally extended their lines back into the lowland area.

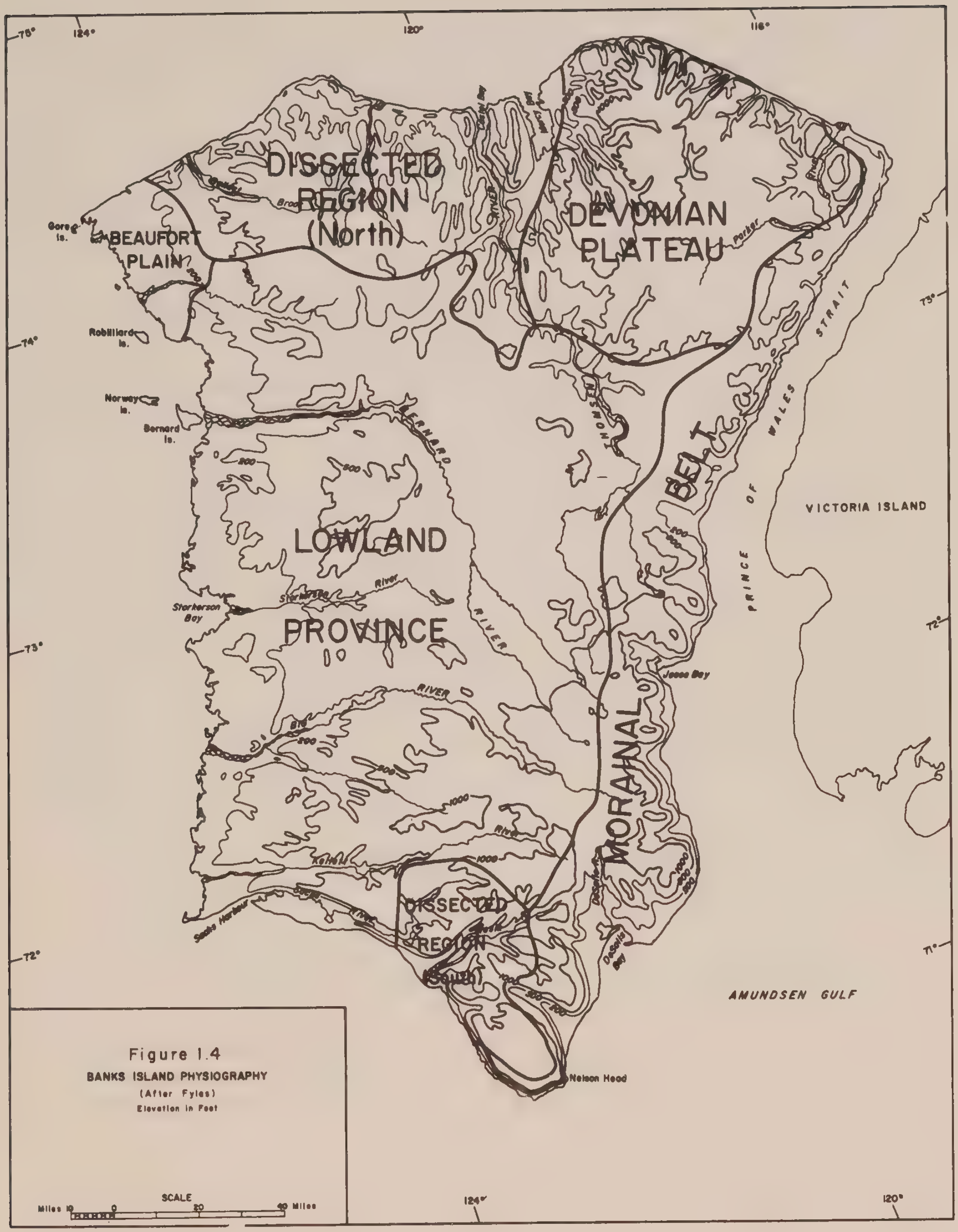


Figure 1.4
BANKS ISLAND PHYSIOGRAPHY
(After Fyles)
Elevation in Feet

The density of dens on Banks Island is unknown.[1] The Bankslanders do not trap dens, as the practice is to run long lines of evenly spaced traps. Fox dens are probably most prevalent in the tussocky valley sides or near low sandy banks. Since the trappers tend to follow valley flats, or coastal beaches, it is not surprising that even the most experienced know of perhaps only twenty dens on traplines of over 100 miles. One cannot, therefore, make any estimate of den density from observational data.

McEwen, in his study of Banks Island foxes, found their chief food source to be lemmings, arctic fox, caribou and ptarmigan in that order (1955:28). Two varieties of lemmings inhabit the Island: the varying or collared lemming (*Dicrostonyx groenlandicus*) and the brown lemming (*Lemmus trimucronatus*). No systematic study of these animals has been made on the Island, although they are in effect the basis of its economy.[2] The cycle of the two species has been observed to be synchronous on Banks Island, but not always so (McEwen, 1955:51 and Manning and Macpherson, 1958:25).

The significance of arctic fox in the diet may be both seasonal and cyclical. The trappers state that in years of fox abundance, the cannibalizing of trapped foxes by their own kind is common, and the proportion of damaged pelts and half-eaten carcases rises significantly. Just such conditions prevailed at the time of McEwen's study.

In summer, the Island supports a large bird population, including cranes, ducks, and geese, and the ptarmigan is a year round resident. In spring, foxes are commonly seen prowling about the snowgoose nesting grounds at Egg River, and both birds and eggs are probably an important seasonal dietary item. The tendency of arctic foxes to scavenge on seal carcases left by bears has been widely reported in the Arctic, and Banks Island trappers have observed this as well. Thus, in winter, the frequent presence of open leads among the west and southwest coasts, and a large local polar bear population, probably provide another food source for the foxes.

The arctic hare (*Lepus arcticus*) is abundant in some parts of the Island, and is doubtless another source of food. It appears then, that foxes on Banks Island depend largely but not entirely on lemmings. The availability of other food sources, particularly at critical times of the year, may serve to raise survival rates beyond what even a periodically abundant lemming population could alone support.

In availing themselves of this food supply, foxes suffer little competition, and they are also relatively free from predators. There are only eight other terrestrial mammals native to the Island. Three of them (the two lemmings and the hare) are prey species, and two are ungulates whose existence is of little direct consequence to the fortunes of the arctic fox. The ermine is a competitor for the lemming supply, but is not nearly as numerous as the white fox, and moreover in some cases may be his prey. The other two are the wolf (*Canis lupus*), and the polar bear (*Thalarctos*

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[1] An isolated observation by Maher (1964) showed three dens in ten square miles, on the north shore of the Bernard River, in the lowland physiographic province.

[2] W.J. Maher has made a brief investigation of lemming predators in the Bernard River area (1964, 1967).

maritimus). Wolves have been periodically abundant on the Island, but they are perhaps a greater threat to the trapper than to the fox. They can cause great losses by damaging trapped foxes, and although they doubtless prey on untrapped adult and cub foxes, there is no evidence that the level of such predation has ever been high. Wolves are reputed to eat lemmings and thus would be competitors of the white fox; on the other hand the remainders from their ungulate kills provide an additional food source for foxes. In any case wolves have been rare on the Island (at least in the southwest) for a decade.[1]

Polar bears (which are perhaps more correctly classed as marine mammals although they do occasionally wander inland) play a role similar to the wolves in fox ecology. They may at times prey on foxes, but the extra food they provide in the form of seal remainders may well outweigh the mortality inflicted. Grizzly bears, wolverines and coloured foxes, three potentially important predators and competitors, have been reported on Banks Island, but they are strays and not native to it, and therefore do not affect the white fox.

Several species of hawks, jaegers and owls present on the Island in summer are known to prey on lemmings, and some of them prey on cub foxes as well. Possibly more important than any of the above factors are epizootics which commonly occur in years of fox abundance. The proportion of the total stock affected is unknown, but it may be quite high. Parasites may be an additional factor in fox mortality.

Thus, although there is no direct census information on the arctic fox population of Banks Island, both the trapping returns and the nature of the habitat suggest that it is indeed abundant.

In order to proceed beyond these facts, it is necessary to rely on the findings of scientists in other areas, and on the observations of the Banksland trappers themselves. Some of the analysis which follows is therefore speculative. Although the trappers are keenly observant, many have developed their own theories on fox abundance and movements, and one must take care to separate observation from hypothesis when using such data.

Certain fundamental questions must be examined in order to understand the economic geography of Banks Island. Can we measure the abundance and sustainable yield of foxes on Banks Island, and how do these vary with time and place? Where do the foxes trapped on the Island come from? Are they resident or migratory, or indeed, can one speak of a distinct Banks Island population? Can trapping areas be delimited and their productivity measured, since traps are set in lines rather than networks, and especially if foxes are wide ranging and not restricted to relatively small territories?

Observation by Banks Island trappers

If there is anything the Bankslanders are certain of it is that foxes move, even migrate, over great distances. There has never been any mass tagging of arctic foxes in the Canadian Arctic, let alone on Banks Island, and we are again without direct

[1]The result of a successful poisoning programme undertaken between 1955 and 1959 to curb the widespread destruction of trapped foxes (McEwen, 1955 and Usher, 1966).

evidence on this exceedingly important question. McEwen was unable to substantiate trappers' observations of "runs", but did not discount their possibility (1955:27). The trappers' theories about runs and migrations are inferred from circumstantial evidence. Many tracks in one direction, or a sudden catch (especially on the return trip) on trap lines previously thought "dead", are indications of significant movement, but how far such animals are travelling, and whether they maintain their apparent direction over long distances, simply cannot be known. Foxes caught inland with seal blubber stains around their mouths indicate they must have come from the floe edge; from which direction and at what time is again problematic. Many such occurrences suggest certain patterns of movement. Until better information is available (and it will only become so with a mass tagging programme), it would be ill-advised to reject the trappers' beliefs out of hand.

The Bankslanders believe that there is a basic seasonal movement of foxes, as follows: after freeze-up, some foxes begin to move off the land and on to the sea ice, where they spend most of the winter. In late winter, these foxes return to the land again to begin the breeding cycle. Reports of "runs" are most frequent before Christmas, when the trappers say the foxes (at least of south central Banks Island) move north and west, and during the last month of the season, when foxes begin to move inland. Blubber stained foxes have been trapped over 60 miles from the nearest coast, chiefly in spring.

The magnitude and importance of these movements is reputed to be a function of the population cycle. According to the trappers, the catch patterns described for the years 1964-68 are quite typical, and are to be explained by cyclic movements.

In very poor years, the trappers depend on heavy spring runs, which are interpreted as the beginning of an upturn in the cycle. In average years, it is expected that catches will be somewhat better in the early and late parts of the season, with the low point coming after Christmas during the coldest months of the year. In peak years, the pre-Christmas abundance of foxes is explained by the large numbers of young foxes believed to be present, and there is indeed an above average occurrence of immature "bluebacks".[1] A noticeable decline in total abundance after Christmas is expected. In the year following, the trappers believe that a good number of the previous season's foxes are still on the Island in the autumn, but depart with the onset of winter, resulting in a good catch on the first trip but a decline thereafter. Such a pattern was predicted by many of the trappers in the spring of 1967, and a preliminary tabulation of the 1967-68 returns show that this was indeed the case.

In addition, the trappers believe that there occasionally occur movements of great magnitude and distance, and these are associated with population maxima. Not all maxima are the result of migration waves, for in the occasional winter, very little movement is observed, and this is attributed to a continuing abundance of lemmings during the winter. In such cases, even the normal seasonal migration fails to develop. It is then possible to move one's trapline a few miles to the side and start getting

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[1] Whelps turn prime later than adults, and at the beginning of the trapping season the underfur on their backs may still exhibit a bluish colouration.

foxes again; indeed this is necessary for good results, since once the initial line is trapped out, one cannot depend on late season runs. Such conditions are said to have prevailed in the peak year of 1938-39. In other peak years, such as 1966-67, the normal November-December exodus is thought to occur, resulting in very large catches during those months. There are still other years, however, in which high catches are attributed to migrations of more striking proportions. These are thought to be associated with sudden lemming declines which are synchronous over fairly wide areas, although that may not be a necessary condition. At such times foxes are said to be coming from Victoria Island or even further.[1]

To conclude, there is apparent evidence that foxes on Banks Island do indeed move, and in some seasonal or cyclic pattern, but we have no direct evidence of the numbers, distance or directions involved.

Biological observations from other arctic regions

Since observational data from Banks Island are so limited, it is necessary to examine what other investigators have discovered about other populations of arctic foxes. Their findings do not necessarily apply to the foxes of Banks Island, but they may suggest certain explanations for the phenomena observed there.

Life cycle

The life cycle and population dynamics of the arctic fox appear to involve an extremely high mortality rate amongst the young in all but the most favourable years. On Banks Island, foxes begin pairing as early as mid February, according to the trappers, and start opening and cleaning out their dens in late March. Mating apparently occurs in early April, and after a gestation period of about 53 days (McEwen, 1955:25), the young are born in late May or early June. These dates can, of course, vary from year to year. In the Keewatin, Macpherson found a mean litter size of 10.6 at implantation, with little change from year to year, but the number weaned varied from 4.6 to 9.7, the mean figure being 6.7 (1969:33-34). Further mortality occurs in late summer and fall and the life table devised by Macpherson

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[1] The Banksland trappers, and indeed the mainland trappers as well, have their own theories to account for mass movements of foxes associated with the cycle. Two elements are particularly common. The first is that the cyclic abundance of foxes is accounted for primarily by migration rather than changes in natural increase or decrease. In a good year, foxes from other areas have migrated to the Island, while poor years are the result not of mass starvation and death, but of outmigration, because foxes follow their food sources, which are also migrating. Some believe in migration circuits through the Canadian Arctic, for example from the other Arctic Islands to Banks Island, then to the mainland, across to Keewatin and north again into the islands. Others believe the migration pattern is circumpolar, with the foxes going to Alaska and the U.S.S.R. Some white trappers share these beliefs; beliefs which are consistent with the concept of "limited good" which recurs in the local culture (see Volume Three, Chapter One). The conflicts which arose in earlier years over supposed interruptions of the migration routes between Banks Island, Victoria Island and the Mainland coast will be recalled (Volume One). The belief in such migrations is still strongly held by all parties. The other belief is in the distinction between travelling and non-travelling foxes. All trappers insist that such a distinction is easily made. Travelling foxes are fat, while others, sometimes called "creek" foxes (for reasons uncertain), are very lean. Paradoxically, travellers tend to take bait, while the others are not attracted to it. Travellers also have better fur. It is assumed that any fat fox taken must have been travelling. Fat foxes are also said to die more quickly in the traps, but in view of the fact that some foxes can live over a month in the trap, any fat fox which did so would presumably no longer be fat, so this hypothesis is untestable if not tautological.

(ibid.:41) shows that on the average less than four out of the original litter of 10.6 are still alive at the opening of trapping season. The animals mature within a year, and about one third of the females breed in their first or second year, while by the third year, 85 per cent breed (ibid.:32). Little more than five per cent of the cohort survives into the fourth year, although Smirnov (1968:82) who has developed a method of aging foxes by cementum deposition on the teeth, has recorded foxes nine years of age. It appears that in years of lemming abundance, whelp survival is very high, and their abundance at such times results in the very large harvests associated with the peak of the cycle.

Age structure and trap proneness

Cohort analyses of catches in Yamal (Smirnov, (1968:89), Cornwallis Island (Macpherson, 1969:26) and in the Keewatin (ibid.:28), indicate that in peak years perhaps 90 per cent of the catch consists of whelps. The proportion of whelps surviving to the trapping season which are trapped in the first year can be up to 90 per cent but may well be less. Macpherson has suggested the following hypothesis to explain the prevalence of whelps in peak year catches:

> "In a year of high abundance, the adults are relatively scarce, and remain in occupation of their breeding territories. The whelps, on the other hand, are numerous, and few of them enjoy the possession of settled territories. They may also be harried out of the territories of the adults, and thereby be kept on the move. The traps take the settled adults in whose territories they happen to have been set, but for the most part they catch the wandering, harried whelps. Consequently whelps are vastly overrepresented in the catches of such years." (1969:39).

Denning

In some areas of the Soviet north, den densities of the order of one per square mile to one per three square miles have been reported (viz. Danilov, 1961: Dementyeff, 1958; Shibanoff, 1958), although Boitsov (1937) believed the density for the U.S.S.R. tundra as a whole to be rather less. Macpherson (1969:15), in a survey of almost 2,000 square miles of the central Keewatin, found a density of one den per 14 square miles there. Fur returns from that region do not suggest that it is less productive than other parts of the Arctic. The Russian literature is seldom accompanied by maps or detailed accounts of the methodology and circumstances of den surveys, and thus one cannot readily account for this disparity in observed densities between the two countries. However, all dens are never occupied simultaneously. Den occupancy ratios have been recorded as high as 63 per cent (Macpherson, 1969:11) and 74 per cent (Shibanoff, 1958). Macpherson found that the highest rate occurred in the spring following a bumper harvest. However, in lean lemming years, a significant proportion of the dens are abandoned.

Movements

There appear to be several types of movement which arctic foxes undertake: local movements, migratory movements, dispersals and sporadic movements. McEwen has called these local, seasonal, migratory and sporadic movements (1951).

There is evidence that arctic foxes are territorial (viz. Macpherson, 1969:16), and local movements may therefore be defined as those occurring within the individual territories. The extent of these individual territories varies from year to year, depending on the abundance of food and the need to range more or less widely for it. The density of occupied dens may suggest the size of the territories, but, since Macpherson has concluded that den occupancy ". . . is limited neither by habitat nor by territorial behaviour" (1969:16), this would give a maximum estimate.

Among some populations of foxes at least, there is good evidence for migratory movements. These are fairly regular seasonal movements from one area to another and back again. Soviet biologists have long believed that seasonal migrations occur among their arctic fox populations (viz. Lavrov, 1932 and Shibanoff, 1958). The usual tendency noted is for the animals to move out to the sea ice in early winter and return to the land in spring. Perhaps the best documentation of seasonal migration has been made for the Yamal and Nenets area (Shilyaeva, 1968).

Dispersals refer to occasional mass movements over long distances which do not necessarily involve a return, and are associated with population maxima. They are the least known type of fox movement, and their documentation is often suspect. Sporadic movements refer to extra-limital occurrences which are also normally associated with population maxima, and so may be included in the discussion of dispersals. There is no question that foxes do on occasion move over very long distances, and this is not restricted to land areas. For example, foxes have been sighted on the ice in spring up to 200 miles northwest of the Queen Elizabeth Islands (personal communication, E.F. Roots, 29 August, 1968), and their tracks have been observed all the way from Ellesmere Island to the North Pole (personal communication, C. Jonkel[1]). Although there is no evidence to support the circumpolar migration theory held by some trappers, it does seem probable that under certain conditions, larger numbers of foxes do move a considerable distance. Such movements are perhaps not unexpectedly associated with population maxima. Foxes may then travel 200 or 300 miles or even more in a short time, and it is at such times that strays are reported far beyond their normal range. Many Russian biologists accept this notion, although Canadian biologists have been more skeptical. Maksimov (1945) for example, describes foxes moving outwards in every direction from a central area like an earthquake from its epicentre, although terrain and the onset of freeze-up may act to channel these migrations. Braestrup (1941) has also found evidence for periodic invasions of Greenland by Canadian Eastern Arctic foxes, probably associated with sudden lemming scarcities. No such occurrences have been adequately documented in this country, although there is fragmentary evidence. Shilyaeva (1968) believes that even a well fed population with a good supply of food can get caught up in a migratory stream.

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[1] From a letter to him from A.C. Aufderheide of the Plaisted Polar Expedition, 10 July, 1968.

Hypotheses for Banks Island

Size of territories

In order to approximate the size of arctic fox territories on Banks Island, it is necessary to determine the number of breeding pairs. Since there is no direct information on this matter, one can only make a rather tenuous deduction, using known harvest figures for the Island, and reproductive data from elsewhere.

The very best trapping seasons on the Island have produced crops of 7,000 to over 11,000 foxes, including those lost from or destroyed in the traps. There are two possible sources, operating separately or in combination for such harvests. Either the foxes reside in the trapping area, or they are migrating through from somewhere else. Let us suppose that no foxes move beyond their individual territories, so that such catches must be accounted for entirely by local foxes with no immigration (the validity of this approach is explained below). This would require that in a trapping area of about 10,000 square miles there is a sufficient basic population to produce occasional catches of 10,000 foxes or more.

According to the findings already noted with regard to age structure and trap proneness, this would require a spring cohort of which a minimum of 10,000 survived their first six months of life. If 15 per cent of the cohort died during August, September and October (apparently a conservative estimate), 12,000 whelps were weaned, and as mortality between implantation and weaning would have been low, perhaps 13,000 in all were born. About 1,250 breeding pairs could account for such a progeny.

This would suggest territories of about eight square miles at denning time in peak years of abundance. Since breeding populations are thought to vary by a factor of no more than three (Macpherson, 1969:38-39), this would suggest that territories are seldom larger than 25 square miles in spring.

Movements

If the above territory sizes are approximately correct, local movements would be restricted to within a three mile radius of the den, and sometimes less in years of abundance (assuming roughly circular or hexagonal territories).

Soviet observations of fox movements are certainly congruent with those made by trappers on Banks Island, and suggest that there may indeed be a seasonal migration pattern there. Both the trappers' observations and the monthly distribution of the catch can be explained by the existence of a resident Banks Island population,[1] of which some age classes, particularly the adults, move seasonally to and from their breeding grounds. Low midwinter catches may be due to the absence of part of the population, while the spring "run" is the result of the return inland to

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[1] We are assuming, in the absence of any evidence to the contrary, that there is a distinct Banks Island fox population, and that most foxes at least return to the same denning areas year after year. One cannot discount the possibility, however, that at least occasional interaction and intermingling of fox populations occurs. For example, some Banks Island foxes may not return after wintering on the sea ice, but rather travel to Victoria or Melville Islands, or vice versa.

breed.[1] In a very poor year such as 1964-65, and to a lesser extent the mediocre year of 1967-68, the return of breeding adults would account for a large proportion of the catch due to the relative absence of young foxes. The patterns in Figure 1.3 are also consistent with an early winter movement to the coast, but not as clearly so as with the spring movement. The autumn variations seem to be more a function of the fox cycle. In average years (e.g. 1965-66, 1967-68), the December decline may be explained by decreased fox activity, or their departure for the coast, or both. However, in the peak year of 1966-67, the spectacular rise in December was probably a result of the abundance of young foxes which, without their own territories, are more mobile, but not necessarily with any established pattern. However, it is not clear exactly when the adult movement takes place; some trappers feel they are the first to leave, and the young ones eventually follow. If this were true, the early part of the season would be unproductive in poor years when there are so few young foxes around, but it would not explain why at least part of the population stays inland throughout the winter. The upsurge in the January catches in 1965 and 1966 is left unexplained by the suggested seasonal movements, and the occasional catches of blubber stained foxes inland as early as January would also indicate that our hypothesis is incomplete.

If overland seasonal travel does occur on Banks Island, the maximum distances involved are probably 60 or 80 miles, although the distance travelled on the sea ice beyond the coast may add substantially to this.

Finally, mass dispersals may occasionally take place in the area. The possibility cannot be discounted that during population maxima, foxes may travel over distances of several hundred miles, and that, for example, a dispersal originating in central or northwestern Victoria Island could head across Banks Island, gathering more animals with it, and proceed to the Beaufort Sea. In any case, it is sufficient to note the possibility of such movements, since their existence does not really affect the outcome of the present discussion.

The most obvious conclusion to be drawn from the above discussion is that our knowledge of fox movements is extremely limited, and that a broadly based, long term tagging programme is required to remedy this. Nonetheless, it seems reasonable on present evidence to suggest that these movements fall into three ranges. Intra-territorial movements are restricted to a few miles, depending on the year, but the average radius should be close to three miles. Overland seasonal migrations are probably up to 60 or 80 miles, although additional territory may be covered on the sea ice. Occasional dispersals at cyclic maxima may involve movements of 200 or 300 miles, and sometimes much more.

Trapping areas

If foxes movements were limited to their own territories, the problem of delimiting and measuring trapping areas would be relatively simple. As a general rule, a trap would be assumed to exploit or "tap" an area of three miles radius around it,

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[1] An alternate explanation, of course, is that fox activity, and therefore the fraction caught, increases in the warmer months. McEwen noted a tendency for fox activity to increase directly with temperature and daylight (1955:26). This would not rule out the seasonal movement hypothesis, however, since both may be operative.

since that is the approximate mean radius of fox territories on Banks Island. A trapline thus taps a band of terrain six miles wide. The land use area for a network of traplines would be bounded by a line three miles outside the perimeter of the network, except that any areas within it which were more than three miles distant in any direction from a trapline would constitute unutilized interstices.

The problem of unutilized interstices is removed by introducing seasonal movements into this land use model, as the animals in these areas would then have at some time to move across the trap lines. With regard to the exterior boundaries, if the resident foxes move from down to the sea and back again, this need not affect the basic three mile limit around the network, unless some foxes normally resident outside this area must regularly pass through it while migrating. This is possible, as the accounts of trappers (and of many Russian biologists) indicate that foxes tend to move down river valleys and along coasts. It is hardly coincidental that trappers tend to favour such areas; for example, while less than 20 per cent of the lowland physiographic province is below 200 feet elevation, about 30 per cent of the intensively trapped area, and almost 40 per cent of the total trap line mileage area are. Fully 60 per cent of the trap line mileage lies along the coast or in the main valleys. It will be recalled that the valley sides are likely the best fox habitat in addition to providing natural routeways for both the fox and the trapper. If the valley migration route notion is at all valid, it would suggest that resident populations of entire watersheds tend to funnel through the major river mouths. On Banks Island, however, the divides between most of the watersheds are not significant landscape features. If there are any topographic determinants of fox migrations on the Island they would probably be the high plateaus of the north and south, and the eastern morainal belt. It may thus be more appropriate to conceive of a fox population resident in the area bounded by these features (consisting chiefly of the lowland province), in which the seasonal migration pattern is essentially an east – west one to the Beaufort Sea and back again. Most of this area is already trapped, and only in the Bernard-Thomsen watershed area, and the north side of the lower Bernard valley, might we suspect the present network of traps to be exploiting additional foxes residing outside the perimeter.

The judgement about which interstices may properly be said to be exploited in view of seasonal movements must be partly subjective, since there is no firm evidence, and the hypothesis is in any case speculative. The general density and configuration of traplines in the surrounding area, and the profitable direction of fox movements, must be taken into account. Areas of several hundred or even thousand square miles, enclosed by a single trapline, can hardly be considered to be exploited effectively.

What effect does mass dispersal have on this scheme? No doubt there are years in which the catch is greatly augmented by immigration or "through migration" of foxes, and by wandering young foxes without territories. The most reasonable supposition is that in the long run these movements balance out. Such migrations may seem advantageous to the trapper, since he can exploit an alien population in transit as well as the resident population of his own area. Eventually, however, it must be supposed that some of the foxes in his own area will migrate out, which will reduce his chance of catching them, and provide another area with an alien population in transit. If the migrations from northern Banks and Victoria Islands

passing through southern Banks accounted for all of the big harvests there, how could the frequent occurrence of simultaneous maxima at Sachs Harbour, Holman and Read Island be explained? Obviously there are times when foxes are abundant throughout the Western Archipelago in both trapped and untrapped areas (the possibility that all the foxes of this vast region could manage to gravitate exclusively to the relatively small utilized areas may be safely discounted).

Thus, while it is true that many of the foxes caught on southern Banks Island may have come from elsewhere, it would be difficult to maintain that the catch is consistently augmented two or threefold by immigration. Is it possible that untrapped areas in the Western Archipelago act as sanctuaries which supply surplus populations to the trapped areas? The Bankslanders believe this to be the case, and they have made efforts to keep the northern and eastern portions of the Island as undisturbed breeding grounds to stock the utilized area. If this were true, it would have to be shown that the depletion of a fox population by trapping is significantly greater than the natural mortality (and/or exodus) that would occur in an untrapped population. If it is not, there is no surplus. If there is a surplus, it would then have to migrate into the trapped area. On a seasonal basis, we would not expect this; in the case of dispersals, if migration were random in direction, only a small proportion would enter the zone of utilization.

Our conclusion then must be that in the long run, the catch of an area of several thousand square miles reflects the carrying capacity and productivity of that area. It then follows that other than for occasional mass dispersal, it is legitimate to speak of trapping areas associated with the distribution of traps and the network of trap lines. The three mile limit around the outside of the network accounts for the average extent of local movement and most cases of seasonal movement, on the assumption that in general, foxes crossing the boundary have either their origin or their destination within the trapping area and are not just passing through.

We have, then, a land use area which because of its definition can be mapped just as readily as the trap line network. This area includes the territories of most foxes in most years which are taken by the traps that lie within it. There is, of course, the problem of degree or intensity of use within this area. A trap which is set for the whole season, especially if it is frequently checked and cleared, should be expected to yield more than a trap set only for the last two months; such a trap exploits its area more effectively. Similarly a trap set in an area of dense fox population or along a migration route will also catch more foxes than one set in an area of sparse population or an area vacated early in the season. There is neither an even distribution of foxes nor of traps in the trapping area, although trappers appear to have learned through experience to set their traps roughly coincident with the greatest concentration of animals. We can measure and map the intensity of trapping effort (viz. the distinction made between moderate and intensive use in Volume One, Chapter Three); we can only guess at the differences in fox distribution within the area. Nonetheless, in broad terms it is possible to define the area, measure it, and calculate the number of pelts taken per unit of it.

Abundance and sustainable yield

It is not possible to determine the absolute abundance or the sustainable yield of foxes on Banks Island, due to the lack of observational data. It may be inferred from trapping returns that the sustainable yield is not being exceeded since harvests continue to be abundant. Table 1.1 demonstrates that over a 40 year period, consistently good harvests have been obtained at the maxima; indeed the year 1966-67 produced an unprecedented harvest. The average yearly take has varied little from cycle to cycle (with the exception of the two unusual cycles between 1940 and 1951 in which trapping did not occur at the minima). Again, excepting these cycles and that of 1933-38 in which trapping effort was unusually low for extraneous reasons during the peak year, there has been relatively little variation in the mean annual per trapper catch by cycle. It was suggested in Volume One, Chapter Three that there were times when the trappers did not appear to be arranging their lines in the most effective pattern and so failed to maximize their opportunities, but this did not necessarily result in overharvesting of the resource. There is, of course, differential pressure within the trapping area. Most trappers find they get better results towards the end of their traplines, rather than in the immediate hinterland of Sachs Harbour where a fairly close network of traplines exists. Overtrapping may be occurring in this area. On the other hand, there is a real variation in trapping intensity as the season progresses: close to home at the beginning, then on subsequent trips the lines are extended. It should not be surprising that the areas trapped right from the beginning of the season should eventually yield fewer and fewer foxes, while the newly extended lines begin to reap a hitherto unexploited harvest. In good years there is no lack of foxes around the settlement if the catches from day lines are any indication. Not only do the trappers extend their lines as the season progresses but many also bring some traps forward from the beginning of their lines to place toward the end. As a result, by the end of the season, trap density on most lines is far greater at the extremities than in the close network nearer the village. Figure 1.5 showing trap density in April 1967, illustrates this very well, and it may be taken as a typical example of late season trap distribution. (The varying width of lines is a representation of relative density and does not imply any delimitation of exploited or unexploited areas).

The trapping season on Banks Island

There are very few days in the year when the Bankslander is not doing something directly or indirectly related to trapping white foxes. There are many ancillary activities related to the trapping livelihood, but in this section we shall concentrate on the trapping season itself and the immediate preseason preparation of the traplines.

Preparation can begin several months before the season, for seldom will a light aircraft arrive at Sachs Harbour in the summer without someone chartering it to deposit cornmeal and coal oil at strategic points along his line. On such journeys the trapper uses the opportunity to study the terrain from the air, perhaps assessing a new route he has in mind for the coming winter. Those trappers whose lines do not pass any lakes large enough for an airplane may stock their lines in other ways. Some go north by canoe in the late summer to places where their lines reach the coast. Others may wait until October and go inland by dog-team, preparing caches while hunting caribou.

TABLE 1.1

Fox production by cycles, Banks Island, 1929-66

Cycle number	Years covered	Length in years	Number of years trapping occurred	Total number of trappers	Total foxes caught	Mean number of foxes per year trapped	Mean annual catch per trapper[a]	Range in mean annual catch per trapper
1	1929-33	4	4	55	7,672	1,816	143	38-265
2	1933-38	5	4	51	5,677	1,419	124	86-180
3	1938-40	2	2	27	7,967	3,984	278	122-433
4	1940-46	6	4	86	15,457	3,864	205	69-391
5	1946-51	5	2	42	7,034	3,517	202	83-320
6	1951-54	3	3	28	5,580	1,860	200	133-294
7	1954-57	3	3	32	7,421	2,474	176	98-300
8	1957-60	3	3	39	5,689	1,896	167	68-305
9	1960-66	6	6	105	17,378	2,896	168	91-322
Total	1929-66	37	31	465	79,465	2,563	177	38-433

[a]Based on the average of the yearly averages.

Source: Volume One, Table A. 5.

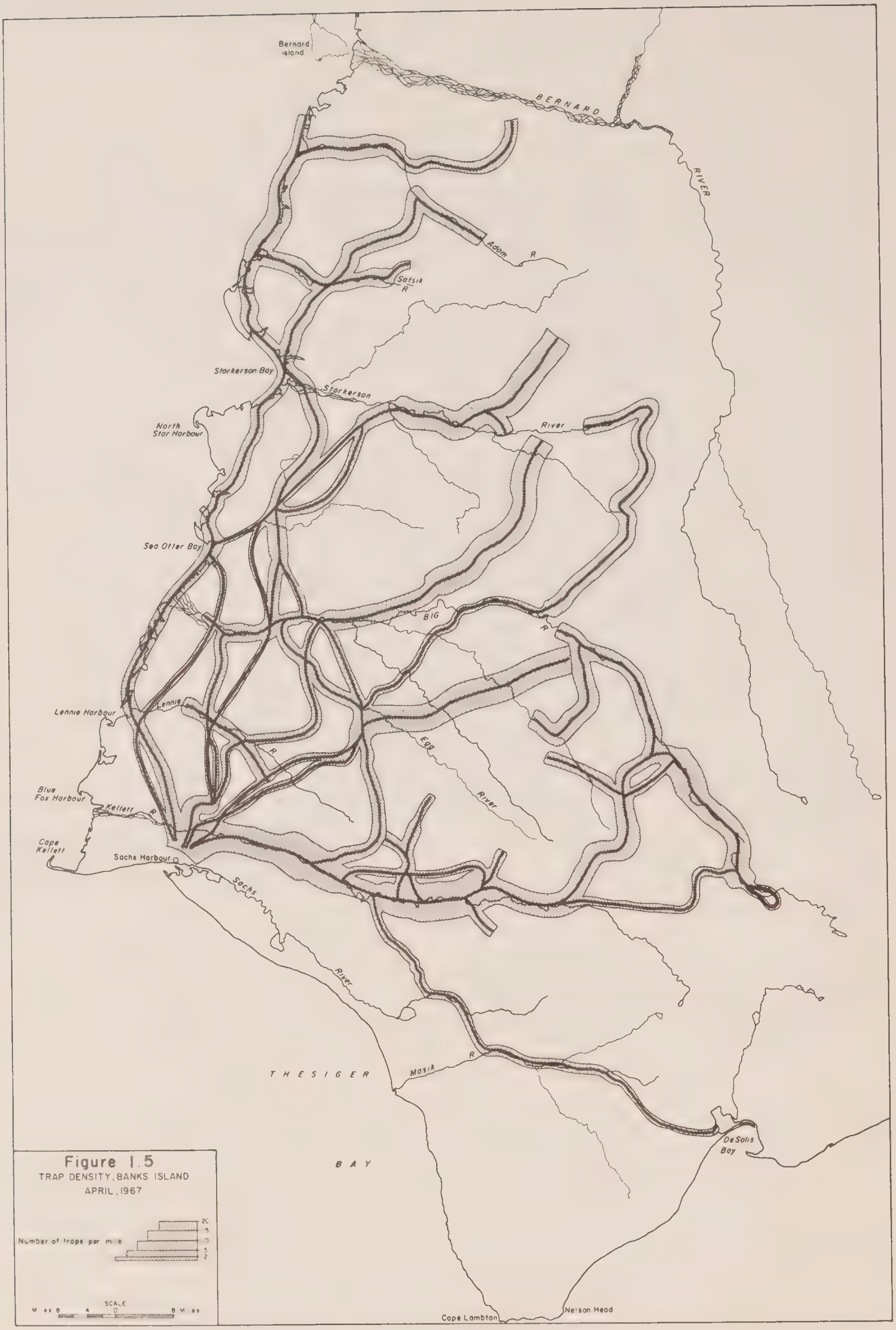

Figure 1.5
TRAP DENSITY, BANKS ISLAND
APRIL, 1967

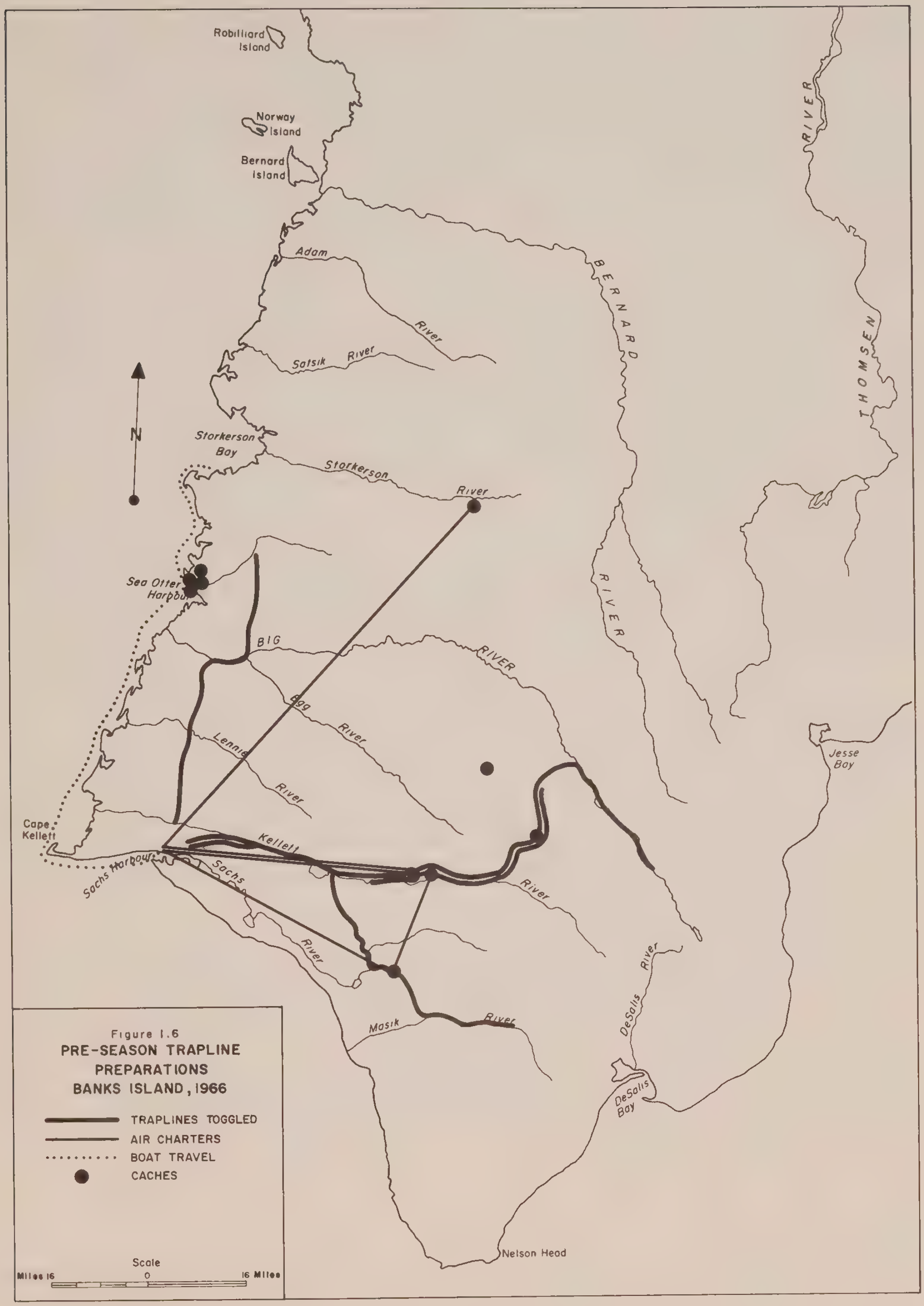

Figure 1.6
PRE-SEASON TRAPLINE PREPARATIONS
BANKS ISLAND, 1966

Figure 1.6 and Table A.1 indicate the level of preseason activity in 1966. Summer preparation was fairly typical of previous years, while autumn preparation, particularly toggling,[1] was down, chiefly because of the unusually late arrival of adequate snow cover for travelling. In 1965, nine out of 16 trappers toggled traps before season, while six out of 17 did so in 1964. In most cases, the same individuals are involved, and these are usually the younger, more aggressive trappers. Some older men resent this practice,[2] since they feel all the trappers should start together "so that everyone can have the same chance". They appear to conceive of a fixed number of available foxes, of which the more someone else gets, the less remain for the others. The younger trappers are inclined to retort that anyone may toggle traps in October if he so chooses, and they fail to see why they should not be able to exercise extra initiative in trapping and reap the benefits therefrom.

There is little doubt that preseason effort can both lighten the subsequent workload and increase trapping success.The cost of chartering planes or of outboard fuel to lay caches was in every case less than $50.00, and although it would be difficult to place a monetary value on the benefits, the advantages of having several hundred pounds (perhaps half a sled load) of supplies already set out at various points on one's trail, should be obvious. The ability to stay out longer and set more traps need only result in two or three more foxes to have made the effort worthwhile. Those who cached seal meat at Sea Otter Harbour (the only location where there is an ice-cellar and thus where meat caching is possible), had a additional advantage, with virtually all their dogfeed needs for the winter already on the trail. It seems remarkable that the practice is not more widespread in the North in view of the minimal investment, and the possibility of increased returns.

Toggling traps in October is also advantageous although some feel wary of committing themselves to a particular route so soon. At the beginning of the season, one must haul traps, choose trap locations, build up mounds of earth and snow, toggle the trap chains in these mounds, then actually open and set the traps. This is time consuming; probably at least as much time must be spent at the trap site as in travelling between them, if not more. If one has already done everything but open and set the traps before season, clearly many more traps can actually be set on the first trip in November.

The N.W.T. game regulations provide for the opening of the trapping season on November 1st, although local trappers' associations are at liberty to request alteration as conditions warrant. There is considerable disagreement amongst the Banks Island trappers about this date; some feel it is too early and results in a high proportion of unprime foxes in the catch, while others feel that at this critical time of the year it is necessary to trap the foxes before they begin moving out of their districts. The latter opinion is held mainly by inland trappers. In 1965, the season

[1] Toggling refers to the practice of placing but not opening traps before the season begins. The sites are selected, and the trap chains affixed, so that on the first trip of the season, effort can be devoted to the actual opening and setting of the traps.

[2] Toggling has developed since 1960, as during the schooner days the autumn was much too busy a period to allow it.

was delayed ten days, much to the annoyance of some. In 1966, on the other hand, it started on the 1st, although it was a late fall, and clearly a peak year with many young foxes, which turn prime later than the adults.

Regardless of when the opening date is set, the trappers are anxious to get out as soon as possible. Conversation in late October turns on little else; plans are made and everyone is in a rush to ensure that all equipment is ready. Competition is especially keen where several trappers follow the same general route, and each wants to be the first to open his traps. Some men are off with first light, others are inevitably delayed and do not get away until the following day. In 1966, eight of 15 trappers managed to leave on opening day, six the next and the last man was off on 3rd November.

Normally the trappers make five or six trips during the winter, each of a fortnight's duration. The first trip of the season is extremely important, not only because the return per trap check is greater at this time of year (except in very poor years), but also because the amount of territory covered will tend to set the pattern for much of the rest of the winter. On the average, about 65-75 per cent of the traps are set on the first trip in November, covering perhaps 55-75 per cent of the final length of the trapline. Stopping and starting with a heavy load, a man can expect to average about four miles per hour travelling by dogs, while if he is making mounds, toggling and setting traps, five to seven minutes may be required for each set (although the fastest trappers can average two and a half or three minutes). In addition caches must be attended to: there are traps to be picked up along the way, and cornmeal and fuel to be deposited. Such caches may be spread along the line perhaps seven to 20 miles apart. With only about seven hours of effective daylight at this time of year, progress is necessarily slow.

In 1966 the mean length of the first trip was 20 days, of which 13 were spent going ahead setting traps, at a rate of 7.4 miles and 31 traps per day. The return journey, checking traps, goes faster although in a big year when a fair proportion of the traps must be cleared and reset, the pace is still slow. The overall rate for the first trip is about 10 or 11 miles per day, with minor variation from year to year. On the second trip, although there is less effective daylight, most of it is spent travelling and checking traps, so that more territory is covered. From then on daylight increases, the return per trap check tends to fall (except in poor years), requiring less work, and daily mileage increases to over 20 by the end of the season.

On the second trip, only slight extensions of the lines are possible, as effective travelling time is so short. Major extensions are made in January or February (some men make only one trip during these two months), and by the end of this period at least 90 per cent of the line has been completed. Such extensions are made partly because the immediate hinterland begins to get trapped out, and also because later in the year the catch is thought to be made up mostly of travelling foxes, and the longer the line, the more likely it will cross the path of a migration. The trappers thus feel that if they had to choose between checking a short line often or setting a lot of traps but seeing them less frequently, the latter would be a superior strategy. On the March trip, one is usually inspecting the full line, which by this time averages about 130 miles in length with 470 traps.

The last trip takes place in early April, and the traps must be shut before returning. Normally the season closes on the 15th, but adjustments are sometimes made for the Easter holidays, or in the case of a poor season a week's extension may be given. Some men pull their lines on the return trip, others on the outward leg so that they can take short cuts home. Most men take out their traps and cache them in piles of 50 or so along the way, although some traps are simply snapped and left toggled in the ground.

In a very big year it is not always possible to bring home the entire catch of a trip, and the frozen foxes must be cached on the trail. In such a case men may have to make journeys inland after the close of the season to pick up these foxes. Normally however, all activity related to trapping (except for the preparation of pelts) comes to an abrupt halt on the 15th of April.

During the 1966-67 trapping season, 43 per cent of the total number of man-days were spent trapping on the main lines, with another six per cent on other forms of trapping and hunting (see Table 1.2). Several men set short day lines close to the village, which they visited between trips on the main line. The very small amount of time spent on seal and caribou hunting indicates how well the trappers had prepared for the season. Even then, some of this hunting was in response to suitability of conditions rather than to prospective food shortages. Caribou are taken quite frequently on the trapline when the opportunity arises, particularly in November. However, this occurs directly in the course of trapping, and is therefore not counted as time spent primarily in the pursuit of caribou.

Visits to the mainland or Victoria Island accounted for over four per cent of the trapping man-days, an unusually high proportion. This leaves 46 per cent of the season which was actually spent in the settlement by active trappers. A significant part of this remainder was spent on activities directly related to trapping: the making or mending of travelling and trapping equipment, and the skinning, stretching and flouring of fox pelts for market. Numerous other chores such as hauling ice and fuel for home use demand time in the settlement as well.[1] The rest is leisure time. Both men and dogs require physical relaxation from the ardours of the trail, but perhaps more important is the need for families to spend some time together. A cheerless atmosphere of loneliness and depression pervades the village when the men are away, especially during "dark days" when visiting from house to house is at a minimum. The Christmas and New Year period is therefore a welcome break and the men all try to be home at this time. Later in the season, the trapping trips become staggered and there are always some men in town at any one time (except for the last trip in April), and though it is still very cold, daylight lengthens and an air of brightness returns to the community.

Trapping skills and route selection

Trapping success is a function of both fox abundance and trapping effort. Three components of trapper effort may be identified. A man must first be skilful in the techniques of trapping and travelling. For example, he must master the manual

[1] Time allocations for these activities are given in the following chapters.

TABLE 1.2

Disposition of man-days during the trapping season of 1966-67, Banks Island

Number of trappers	15
Number of days in season	166
Number of man-days	2490

Activity	Time Period Nov-Dec	Jan-Feb	Mar-Apr	Entire Season
Total available man-days	915	885	690	2490
Trapping (main line only)	541	287	308	1136
Trapping (daylines & short trips)	19	30	17	66
Seal hunting	4	10	8	22
Caribou hunting	2	2	0	4
Total days hunting & trapping	566	329	333	1228
Visits to other communities[a]	32	68[b]	10[b]	110[b]

[a] i.e. trips to Inuvik, Tuktoyaktuk or Holman for business or pleasure.

[b] Does not include time spent in hospital at Inuvik by one man due to an injury.

Source: field investigations

skills of toggling, setting and baiting a trap, and he must know the qualities of different kinds of terrain, snow and ice, both for travelling and trapping. Second, he must know and understand the habits and behaviour of the animals he is trapping. He must know how foxes approach the trap and thus how to arrange markers and baits, he must know when foxes are going for bait and what bait to use, and he must be able to judge where and when foxes are most likely to be plentiful. In the local parlance, he must "study foxes" and "know foxes". Finally he must work hard and maintain a good stock of capital equipment.

The first thing the trapper must do is select a route. Some of the factors involved in this have been mentioned in Volume One, Chapter Three. Most of the older men have developed their routes out of long years of experimentation, sometimes in concert with partners who have long since emigrated. In some cases the sons have inherited these routes, and may have taken on new partners. Newcomers without immediate relatives, or whose relatives were already committed to other partners, have had to find their own routes. This they have done with the aid of maps and of bits of information picked up in conversation, although the established trappers are loath to share their personal knowledge.

Once established in a general area, the trappers seldom change their routes although they may make minor variations in places, particularly at the ends. This is partly because they get to know their routes well and become wary of changing to another route of unproven worth, and partly due to the time and load-saving practice of caching traps along the route at the end of the season. One no longer has to start from home with a full load of traps, but neither can one be as flexible in routing. The trappers generally avoid encroaching on their colleagues' routes, and

this tends to work to the disadvantage of the new arrival, but there has been remarkably little friction over route selection in a situation where there is no institutionalized system of individual territorial or route-line rights. The relatively fixed pattern of routes persisting over several years is a recent development however. In the schooner days it was customary to remove all traps due to the uncertainty of the next year's base camp. Since then the pattern has become much less flexible as individuals committed more and more equipment and knowledge to their routes. Formerly trappers were known to pull their entire lines and relocate them in mid-season to take advantage of localized fox abundance, but this has not occurred for several years.

Having selected a route, the Bankslanders travel in a fairly direct line along it, setting traps periodically along the way. Sometimes they are set as frequently as 10 or 15 to the mile, although the average is three or four. Some trappers set traps in pairs, most prefer to use a single trap at each site. Very occasionally, if a trapper happens upon an animal carcase or a fox den,[1] or some other object likely to attract foxes, he will set out a number of traps around it. In the main traps are more or less evenly spaced, a quarter mile or so apart along the route.

The general preference for coast or valley routes is apparent, although some trappers have overland trails. More specifically, the trappers quite naturally prefer such easily followed terrain features as low coastal or river banks, valley terraces or small stream beds. Where a flat or gently undulating surface is to be traversed, large markers of snow may be erected, but frequently the trappers make their way without these. Small knolls, crests of river or coastal banks, or other small eminences in the terrain are sought for individual trap sites, again partly because of their visibility and partly because foxes tend to frequent such features.

To the uninitiated traveller, slowly sledging across this vast, almost featureless, snow covered landscape in the dull blue half light of midwinter, it seems incredible that anyone could even approximately follow an unmarked route, let alone find every drifted over trap along it. A multitude of tiny visual clues escape this traveller, but the experienced trapper knows those of his own route well, and he also knows the little tricks of navigation by which he can orient himself, such as drift direction, snow consistency, stars, etc. His well trained team of dogs will also assist him in finding the way. In fact, some trappers even if they have set out 700 or 800 traps over 200 miles, can probably visualize the location and set of every single one of their traps.

Steel leg traps are used exclusively. The normal model is the size 1½ trap, usually with a single spring to which is attached a short length of chain with a ring at the end. Plates 5.1 to 5.13 illustrate the basic technique of setting a trap. If no existing knoll is available, a mound is built up out of snow or earth. A small hole is made in the knoll, and the ring is toggled a few inches deep into it. Early in the season, when there is little snow, this usually requires an axe, later on the snow knife is the essential tool. Snow is pressed down tightly into the hole, sometimes with a small stone or clod of earth over the ring, and this soon sets and freezes hard. If done correctly it can only be removed with the aid of an axe at pulling time, otherwise a trapped fox can pull the trap out and drag it off.

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[1] Many trappers, however, deliberately avoid trapping at dens, and feel strongly that their colleagues should do likewise.

Plate 1–1

Plate 1–2

Toggling traps on small knolls near the watershed of the Big and the Kellett Rivers, October 1966. These are typical locations for traps.

Plate 1–3

Chopping a hole for a trap chain, Kellett River, October 1966. Note typical trap location, along crest of a low river bluff.

Plate 1–4

Toggling a trap chain, Kellett River, October 1966.

Plate 1–5

Burying a trap chain, Kellett River, October 1966.

Plate 1–6

Setting a trap, Adam River, April 1967. The trap is in a small depression in the snow mound.

Plate 1–7

Sticking paper to the trap jaws to protect the tongue, Adam River, April 1967.

Plate 1–8

Spreading loose snow over a trap with a snowknife, Adam River, April 1967.

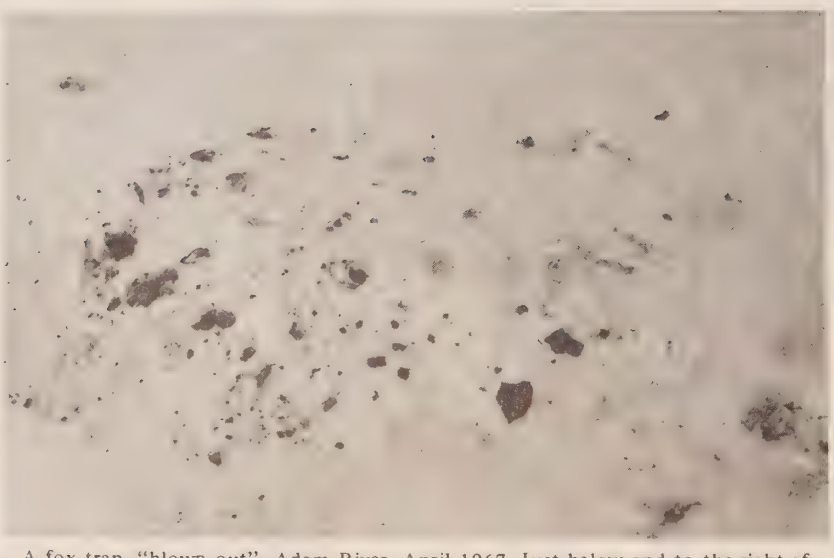
Plate 1–9

Shaving bait over a trap, Adam River, April 1967.

Plate 1–10

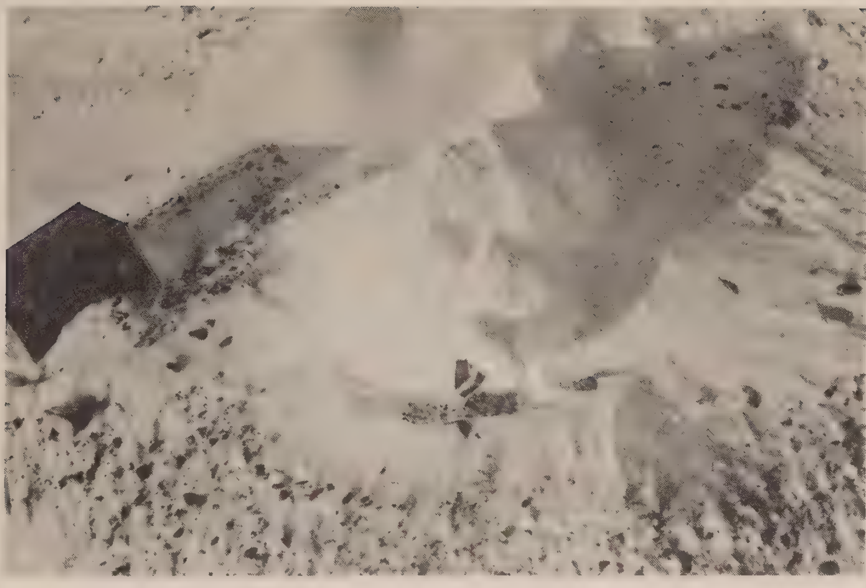
A fox trap, Satsik River, April 1967. The snowblock in the upper left is a marker. A small clod of earth to the right of the marker is used as a stump, and the trap itself lies under the patch of white snow in the centre of the mound below the stump.

Plate 1–11



A fox trap, "blown out", Adam River, April 1967. Just below and to the right of the snow marker, the paper covering of the trap is exposed. Bait has been spread around the trap, instead of using a stump.

Plate 1–12



A fox trap, Kellett River, March 1967. Most foxes are found frozen and drifted over, as in this photo.

Plate 1–13

Removing a fox from a trap, Kellett River, March 1967.

A small depression is made in the surface of the mound, in the shape of an open trap, about an inch or so deep. The jaws of the trap are opened, it is set in this depression, and then papered over.[1] The paper is stuck down at the edges with saliva, and serves the function of keeping an air space between the jaws and under the tongue, so that the functioning parts of the trap can remain operative and not be frozen in. Then a handful or so of fresh, loose snow is placed over the trap, and smoothed level with the surface of the mound with a snow knife. Care must also be taken that most but not all of the spring is covered with loose snow rather than being packed in, so that it can work easily but not be knocked out of place prematurely, Here a knowledge of the different types of snow and their properties when handled in particular ways is necessary. When snow is packed down and the air removed, it will set hard (this is also a basic principle of winter road construction), whereas the fresh, loose snow placed over the trap has no bearing strength and allows it to be triggered when stepped on by a fox.

The trap is then baited and marked. Bait can be placed in a variety of ways; either shaved or sprinkled around or over the trap, or placed in a lump near it, and it will only be used under certain conditions. Seal meat or blubber is often used on the coast, while caribou entrails are favoured inland. Other types of meat are also used, and some men have experimented with commercially prepared scents, although apparently not with extraordinary success. When foxes are not going for bait, especially in late winter, a small "piss stump" is used. This may consist of a clod of earth, a piece of bone or antler, or small lumps of snow cut from where the dogs have urinated overnight; any of these will attract a fox to urinate on it, and when the fox approaches the stump he will be caught. Sometimes both bait and stump are used. Usually a larger clod of earth or a block of snow, set a foot or so away, marks the location of the trap. There are many ideas on the appropriate methods of placing bait and stump relative to the trap. These, along with the exact techniques of covering and baiting traps, are the jealously guarded trade secrets of each individual, but the basic method outlined here is common to all trappers.

Although the rudiments of trapping can be learned quickly, the refinement of its skills comes only through years of experience. Even the best trappers feel they are still learning, although some men in their late twenties and early thirties are already highly skilled. To gain an intimate knowledge of fox behaviour is considered to take even longer, however. The mastery of this aspect of trapping is generally agreed to lie with a very few older trappers. There is no substitute for 30 or 40 years' experience.

Relative judgements can be made about the level of trapping skills and knowledge of foxes of each trapper, but there are no absolute measures of these factors. Trapping effort can be measured, however, and it is apparently the most significant of the three components of trapping success.

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[1] Toilet paper (preferably single ply) is invariably used. One square exactly covers a size 1½ trap, and the roll can be carried on a rope loosely tied around the waist, for convenience and ease of handling. Indeed this is referred to locally as the "trapper's belt".

Effort inputs

There are numerous ways of measuring effort input and relating it to trapping success. Ten aspects of effort were measured in this study, as follows.[1]

1. Size of dogteams.
2. Occurrence of toggling before season.
3. Configuration of the trapline.
4. Miles of trapline.
5. Return length of trapline.
6. Number of trapping trips.
7. Number of days spent on the trapline.
8. Distance travelled.
9. Maximum number of traps set (usually in April).
10. Number of trap checks.

Some of these parameters are self-evident, others must be explained. With regard to configuration of traplines, most men set one continuous line from beginning to end. However, there are other variations such as circular lines or forked lines, and any of these may have small spurs in one or more places. Some lines are looped, usually at the end, while occasionally men run split lines, i.e., two separate lines out of the settlement which are tended separately.

Miles of line is a measurement of the length of an imaginary line joining all traps according to the route normally followed by the trapper. In all cases it refers to the trapline at its maximum length (usually in April).

In the case of a straight line, return length is double the number of miles, while in the case of a circular line this is equal to it. Spurred, forked or looped lines, where some parts of the line are checked once and others checked twice in a trip, give a figure in between.

Only full scale visits to most or all of the trapline are counted as trips here. Occasional day or overnight visits to the beginning of the line, or journeys of a similar length representing false starts on longer trips due to bad weather or other circumstances, have not been included.

Distance travelled is the sum of all travel for all trips (as described above) over the season. It includes travel over short cuts where there are no traps, and the distance between the settlement and the beginning of the trapline, and brings into account trips which did not cover the full length of the trapline.

Trap checks (or trap visits) constitute the closest approximation to a universally comparative measure in fox trapping. Neither the idea nor the term appears to have been used in the literature on fox trapping, although clearly it is the equivalent of the unit of effort in fishing or the trap night in small scale trapping. Ideally such a measure requires standardization both in equipment and in the time

[1] The following analysis is of full-time trappers only, and deals exclusively with their performance on their main lines. Both effort and catch statistics have been excluded for day lines and incidental trapping, except for such catches in 1964-65 and 1965-66, which were impossible to distinguish. The incidental catches for those two years were very small however, and their inclusion does not affect the analysis significantly.

period for which it is used. In fox trapping, where traps may not be checked for up to a month or more, a trap may be sprung within a few days after setting, and thus be useless the remainder of the time. The trap night is therefore of limited value as a measure because there is no way of determining how many and which traps are in fact operative on any given night. Clearly a line which is checked frequently should yield more than one which is left unattended over the same number of nights. Even disregarding this, the data would be extremely difficult to obtain, especially if they were being reconstructed from memory rather than by direct observation. The trap check is not without drawbacks, but the number can be totalled from memory with reasonable reliability. The main disadvantage is that the time intervals between trap checks are not uniform, especially where traps are visited both going ahead and returning on the same trip.

Trapping trips are normally undertaken about once a month. On a circular line, this provides a fair uniformity of interval. On a straight line however, there is considerable variation in the intervals, especially towards the end. If a man maintains a steady routine of two week trips between which he spends two weeks at home, the trap check interval at the beginning of his line is reasonably uniform at about two weeks. A trap at the end of the line, however, may not have been checked for a month, and then the trapper turns around and checks it again a day or two later on his way home, only to leave it for another month. Especially in the latter half of the season, when the bulk of the traps are towards the end of the trap line, these disparate intervals will apply to most trap checks. Trap checks after an interval of a few days should not be expected to yield as much, on the average, as those made every three or four weeks.[1] However, the total number of times any given trap is checked during the year does not vary greatly – usually 10 to 14 times except in the case of circular lines when this figure is halved.

The trap check, although not a perfect measure, is the only one which incorporates both the number of traps set and the frequency with which they are visited.

In addition to these ten basic parameters, there are several rate measures which can be derived from them. These are:

1. Days out per trip.
2. Distance travelled per trip.
3. Miles travelled per day.
4. Days out as a percentage of the trapping season.
5. Maximum (April) trap density, measured in traps per mile.
6. Total foxes caught per trap check.
7. Retrieved foxes caught per trap check.
8. Loss rate (foxes lost as a percentage of the total number caught).

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[1] In 1966-67 (the only year for which reliable data could be obtained) 5716 foxes were taken on outward journeys and 2717 while returning, for a ratio of about 2:1, within the season the ratio varied from slightly more foxes on the return than outward before Christmas to about 9:1 in favour of the outward journey in March and April. Such a seasonal trend is to be expected, although the magnitude may vary. For most years when foxes are much less abundant, probably the proportion of foxes taken on the return journey would be smaller.

The last three indices are related to the measurement of trapping success, which can be judged both in terms of the number of foxes actually retrieved, and of the total number of foxes captured including those which were subsequently lost or destroyed. In the latter case, it is assumed for convenience that animals which escape are not subsequently caught, although foxes are occasionally taken which bear the marks of a previous encounter with a trap.

These data were collected from every trapper for the three trapping seasons 1964-67, for a total of 263 trapping trips, and are summarized in Table 1.3.

All data were obtained through interviews. 1966-67 data were obtained continuously throughout the trapping seasons and their reliability is extremely high; as much so as could possibly be expected. Data for the previous years were obtained shortly after each season closed, and the trappers were asked to reconstruct their activities for the entire winter, aided by written records of catch by month which they all keep. These data are considered reliable, especially when aggregated. The Bankslanders are of course an elite group of trappers; in other areas where this activity is not as significant, post season interviews may not provide such reliable material.

Fortunately for our analysis these three seasons were quite different, the first being a very poor one, the second being average, and the third producing a record harvest. The mean annual per trapper catch over these three years was 270 foxes. This is about 50 per cent above the long term mean (see Table 1.1), so it is not entirely representative of an average cycle. Nonetheless a wide range of possibilities is covered by these three years. As line trapping has apparently not been subjected to this type of analysis before,[1] the figures given in Table 1.3 have considerable intrinsic interest. Beyond this, however, they provide a basis for identifying the factors most closely related to both individual and aggregate trapping success.

Analysis by season, 1964-67

Fox abundance is easily the most important single determinant of the total catch, as the latter varies by a factor of about six while most of the effort indices vary by less than 25 per cent. Indeed, there is no direct positive correlation of catch with effort from one year to another. Effort quotients (see "means" in Table 1.3) were greatest in the year of average abundance, with the good year following and the poor year last (the exceptions were the number of dogs and the number of traps, but these two represented a cumulative growth of capital stock over the three years, unlike the others which represented short term decisions on effort expenditure). Further consideration will be given to this fact when we analyse the expenditure of effort over the season in detail.

[1] Preliminary analysis of the 1964-65 data for Banks Island is given by Usher (1966), although where discrepancies occur the figures given here should be taken as correct. A simple methodology for measuring effort in area trapping (i.e. when trappers exploit distinct and mutually exclusive areas rather than setting their traps in long lines) has been suggested by Danilov (1959).

TABLE 1.3

Trapping effort, Banks Island, 1964-67

Totals	1964-65	1965-66	1966-67	Total	Three year mean
Trappers	17	16	15	48	16
Total foxes	1,793	3,263	9,504	14,560	4,853
Foxes retrieved	1,543	2,966	8,433	12,942	4,314
Foxes lost	250	297	1,071	1,618	539
Dogs	150	149	145	444	148
Number of trappers toggling before season	6	9	4	19	6
Line configurations –					
strait	10	10	4	24	8
strait + spur	1		8	9	3
circle (+ spur)	2	2		4	1
fork (+ spur)			2	2	1
looped	4	3	1	8	3
split		1		1	
Miles of line	2,042	2,417	1,813	6,272	2,091
Return length	3,560	4,095	3,556	11,211	3,737
Trips	85	102	76	263	88
Days out	955	1,283	1,136	3,374	1,125
Distance travelled	15,835	20,965	15,762	52,562	17,521
Maximum traps set	6,715	8,005	7,924	22,644	7,548
Trap checks	48,585	68,995	51,312	168,892	56,297
Means per trapper					
Total foxes	105	204	634		303
Foxes retrieved	91	185	562		270
Foxes lost	15	19	71		34
Dogs	8.8	9.3	9.7		9.3
Miles of line	120	151	121		131
Return length	209	256	237		234
Trips	5.0	6.4	5.1		5.5
Days out	56	80	76		70
Distance travelled	931	1,310	1,051		1,095
Maximum traps set	395	500	528		472
Trap checks	2,858	4,312	3,421		3,519
Rates					
Days per trip	11	13	15		13
Distance per trip	186	206	207		200
Miles per day	16.6	16.3	13.9		15.6
Days out as proportion of season (per cent)	32	50	46		43
April trap density	3.3	3.4	4.4		3.6
Total fox per trap check	.037	.047	.185		.086
Retrieved fox per trap check	.032	.043	.164		.077
Loss rate (per cent of total)	13.9	9.1	11.3		11.1

Source: field investigations.

To identify the factors most closely linked with individual success, a correlation array[1] was worked out involving trapping results (i.e. foxes taken), the basic input measures and the rates already discussed. The analysis was done separately for each year, and then for the mean annual performance of the 14 trappers who were active for all three years.

Table 1.4 indicates the factors most closely related to trapping success. In general, the parameters related to time (trips and days out) are the least closely associated with productivity, while the two functions of line length have a somewhat stronger relationship to it. The two best indicators are trap checks and the maximum number of traps set, although the distance travelled during the season is also quite strongly associated with success.

In almost all cases, the correlation of all these parameters is somewhat closer to the total number of foxes trapped than to the number of retrieved foxes, although these differences are not significant.

The peculiarities of circular lines with regard to length factors and the number and significance of trap checks has already been noted. The anomalous position of some circular line relationships on scattergrams (Figures 1.7 and 1.8) suggested that their exclusion in the calculation of correlation coefficients might well improve the degree of association between certain input parameters and success. The results in Table 1.4 shows that this is indeed the case for most parameters and particularly for trap checks.

Although the number of observations is not great, the consistently close association of both traps set and trap checks with harvest success suggests that these two parameters have considerable predictive power as well. Accordingly, regression equations were obtained for them. In Figures 1.7 and 1.8, the regression lines for all trappers except those with circular lines have been plotted.[2] Since many of the

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[1] A few cautionary words should be given regarding the statistical test employed. The product-moment correlation coefficient has been derived, which is a parametric statistic. Strictly speaking, the data do not fulfill all of the conditions required for parametric statistics. First, the data must be normally distributed. This has simply been assumed, since the data are so few, although scattergrams suggest a slight skew in the distribution of the following key indices: fox catch, 1966-67, trap checks, 1965-66, and traps set, 1964-65. Second, normal distribution requires infinite divisibility of the data, and not all of the measurement scales used here allow for this. For example, a man catches either 146 or 147 foxes, not 146.3; similarly with traps and trapchecks. Measurement of time and distance are on the other hand infinitely divisible. This is not a serious problem, since the range of values is in all cases quite large (i.e. the data are distributed over a range of hundreds or thousands), hence one may assume that the discrete number space employed in fact approximates a continuous number space sufficiently well that the results of the analysis are not invalidated. A more rigorous procedure would have been to use the non-parametric Kendall Tau or Spearman's rank-correlation methods, treating the data on an ordinal scale basis. This, however, would have thrown out a great deal of the precision in the data, since we know not only their rank-order, but also the interval between them. Nonetheless, the use of the product-moment correlation in the present context is not inconsistent with standard practice, and there is no reason to believe that any of the substantive conclusions drawn from this test are in doubt. I am indebted to Dr. Michael Church for drawing these points to my attention.

[2] The regression constants are of course meaningless, and simply indicate the diminishing predictive power of the equations close to the y axis. One could have calculated the equations under the constraint that the lines must pass through (O,O), although in fact this point lies within the confidence limits (not drawn) of all equations derived using the standard method. It has been assumed that the data exhibit linear association. This may not in fact be the case, but the number of data is small, and their scatter great, so that transformation would be of very limited value.

TABLE 1.4

Correlation co-efficients of selected effort inputs with trapping success

a. All lines

	1964-65		1965-66		1966-67		Three year mean	
	1	2	1	2	1	2	1	2
Trips	.523	.494						
Days out	.543	.524	.630	.620	.575	.543	.681	.695
Miles of line			.730	.722	.715	.654	.734	.708
Return length	.507		.578	.559	.727	.661	.787	.735
Distance travelled	.622	.539	.672	.652	.728	.683	.845	.824
Maximum traps set	.786	.788	.853	.844	.749	.694	.876	.851
Trap checks	.794	.769	.627	.613	.820	.808	.798	.797
	N=17		N=16		N=15		N=14	

b. Circular lines excluded

	1964-65		1965-66		1966-67		Three year mean	
	1	2	1	2	1	2	1	2
Trips	.525*							
Days out	.533				.575	.543	.672	.703*
Miles of line			.662	.650	.715	.654	.734	.680
Return length			.650*	.631*	.727	.661	.780	.736*
Distance travelled	.615	.526	.727*	.710	.728	.683	.883*	.866*
Maximum traps set	.789*	.797*	.837	.830	.749	.694	.882*	.854*
Trap checks	.848*	.844*	.788*	.781*	.820	.808	.924*	.929*
	N=15		N=14		N=15		N=10	

For each year: column 1=total foxes
column 2=retrieved foxes
*denotes correlation in Table b showing improvement over Table a.

Note: All correlations significant at the 95 per cent level of confidence. Correlations not significant at this level are not shown.

Figure 1.7

REGRESSION OF TOTAL FOXES CAUGHT ON MAXIMUM NUMBER OF TRAPS SET BANKS ISLAND 1964-67

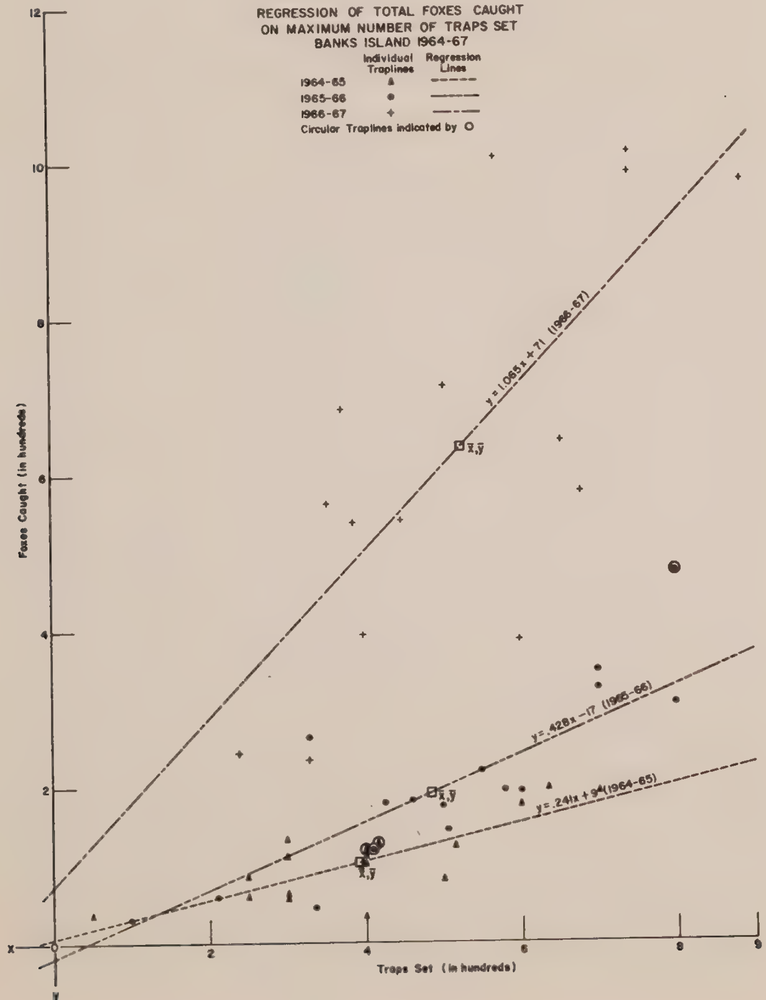
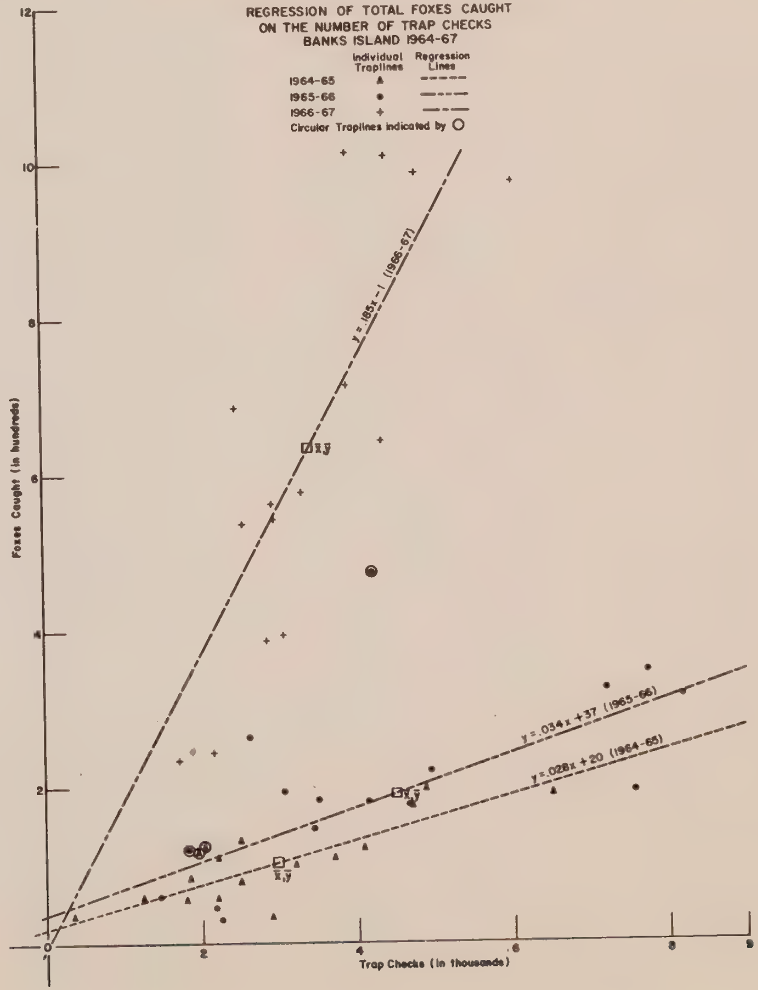


Figure 1.8

REGRESSION OF TOTAL FOXES CAUGHT ON THE NUMBER OF TRAP CHECKS BANKS ISLAND 1964-67



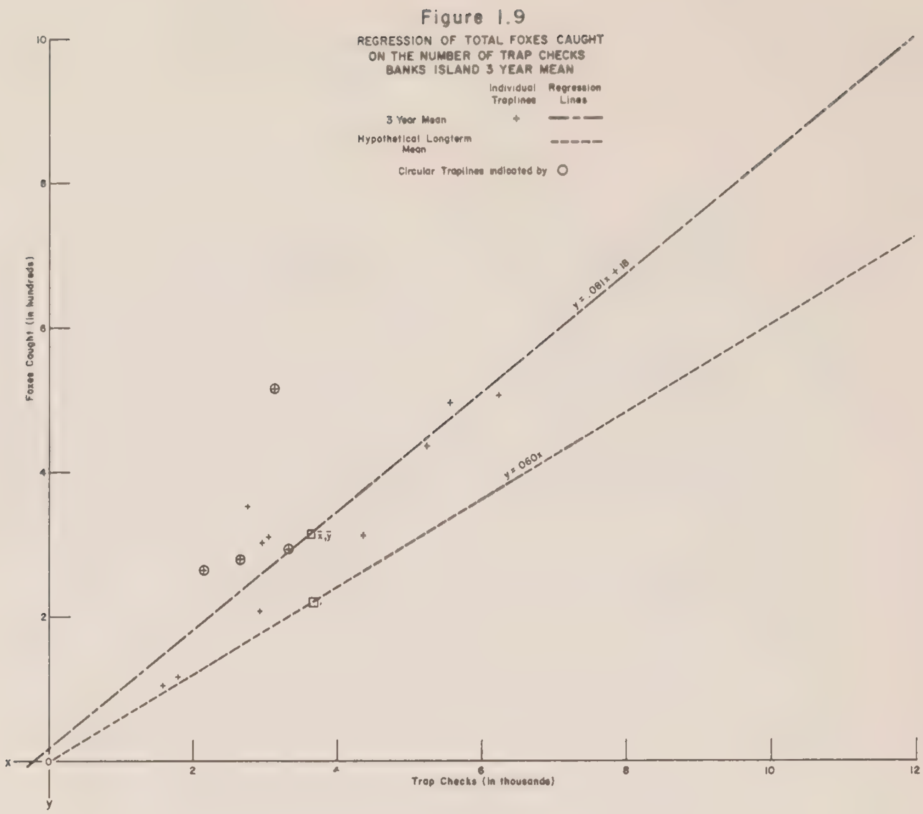


Figure 1.9

REGRESSION OF TOTAL FOXES CAUGHT ON THE NUMBER OF TRAP CHECKS BANKS ISLAND 3 YEAR MEAN

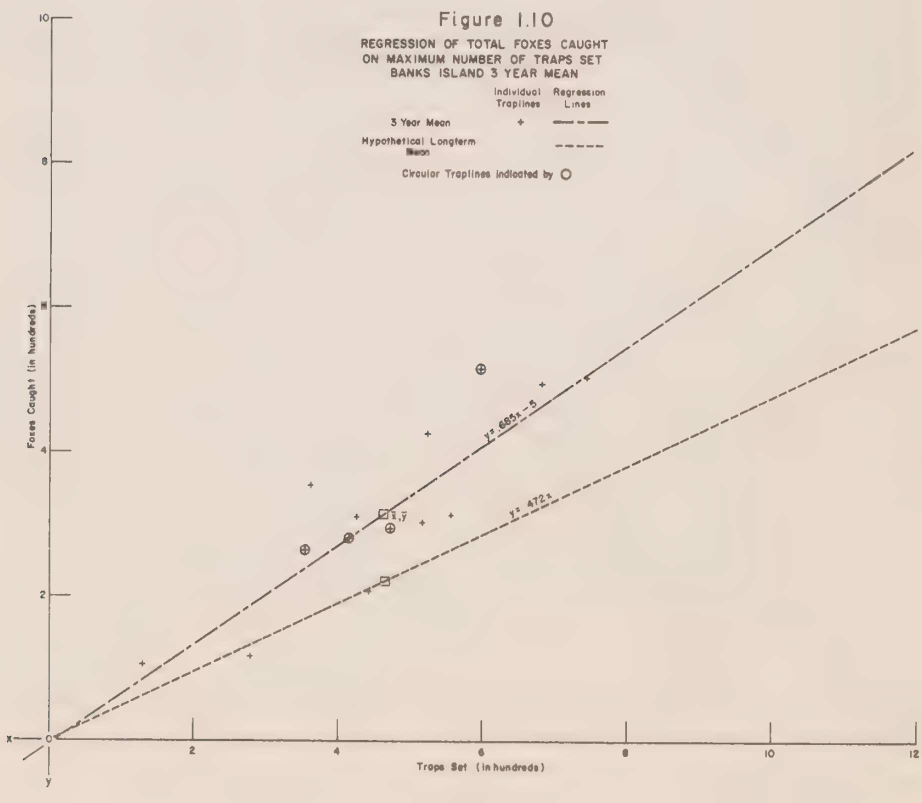


Figure 1.10

REGRESSION OF TOTAL FOXES CAUGHT ON MAXIMUM NUMBER OF TRAPS SET BANKS ISLAND 3 YEAR MEAN

values for circular lines lie within the confidence limits of these regressions, and the equations themselves are very similar, it is not essential that circular lines be excluded from a general predictor equation unless they form a fair proportion of the total. The Banks Island data suggest that circular lines as a class might exhibit significantly different relationships between effort inputs and success, but the number of observations is insufficient.

Intuitively, one would expect that a reduction in the interval between trap checks (and hence a greater frequency and total number of trap checks) would increase the total return, but the rate of increase in return per individual trap check may well diminish. For example if 100 traps are checked twice a month they should yield more than, but not double the number of foxes than if they were checked once a month.

Although both the number of traps and trap checks appear to be good predictors of catch, trap checks has the more universal application. The number of traps is admittedly an easier datum to obtain, and the degree of association between it and the catch is unquestionably high, but the slope of the equation must inherently reflect the frequency with which they are checked. With a given abundance of foxes, the regression of foxes caught on trap checks should have circumpolar application, whereas although an individual in Cambridge Bay might have the same number of traps as another in Baker Lake, unless they check them with like frequency, one would not expect them to have similar harvests.

As mentioned, the three years cover almost the full range of harvest possibilities on the Island. On no occasion has the 1966-67 mean catch of 576 retrieved foxes been exceeded, and only in five years has the low fallen below the 1964-65 mean catch of 91. The 1965-66 mean catch of 186 falls very close to both the long term mean and to the cyclic means since 1954. We have, therefore, regression lines which should be broadly characteristic of the maximum, minimum and mid point of the fox cycle. In almost any year, the regression of foxes on trap checks should fall between the two extremes plotted.

Figures 1.9 and 1.10 show the regressions for the 1964-67 three year mean. The mean annual individual catch for this period, based on the trappers included in the sample, was 315 total and 279 retrieved. This compared with the overall annual mean of 200 foxes retrieved per trapper during the most recent historical period (1961-67) and 194 since 1955. However, both the mean effort inputs, and the loss rate of trapped foxes appear to have remained fairly stable for quite a number of years, so that the values for the period 1964-67 are considered to be representative of as far back as the early 1960s or even the mid fifties.

On this basis it is possible to plot a regression valid for the long term (i.e. up to 10 to 15 years) means of both effort and catch. Current loss rates indicate that the mean annual total fox take is in the order of 220 per trapper, while from Figures 1.9 and 1.10, the number of traps set is 466 and the number of trap checks is 3,656. On logical grounds, the point of origin must be (x=0, y=0) and in fact this point is within the confidence limits of all the equations derived from the data. The lines

plotted on this basis are shown in Figures 1.9 and 1.10. The equations are as follows:

Total foxes = .060 trap checks

Total foxes = .472 traps

Although there are clearly several sources of error in applying these estimator equations, they provide a first approximation of the relationship between effort and success in trapping on a full cycle or longer term basis. It should also be noted that the extension of these regression lines beyond the limits of the data merely shows *in a very rough fashion* what the results of increased effort might bring. The predictive power of the equations diminishes toward the extreme ranges of the data in any case, and as mentioned, it is also possible that we are not in fact dealing with a linear association. Hence extreme caution should be used in applying the extensions of the regression lines.

Intra-seasonal analysis, 1966-67

A better understanding of the patterns and variations of trapping effort may be gained by breaking down the seasonal totals. With five to six trips being made in five and a half months, the season may be seen to fall into three parts. The period before New Year, lasting two months or less depending on the opening date, involves much work in setting out the line, but also is a period of high return per unit of effort. The midwinter period of January and February sees the virtual completion of the lines but the pace is less hectic and the returns are down. Despite the lengthening days and the opportunity for longer working days on the trail, this is the coldest part of the winter. Most of the time is spent in the less active work of checking the traps rather than setting them, and the trappers set out with considerably less enthusiasm at this time of year than in the early or late winter. The final period (March 1 – April 15) is only one and a half months long, but normally two long but quick trips are made, for it is at this time that the benefits of the line extensions made in January or February are reaped, and there is an increased possibility of fox runs. The number of trap checks invariably shows a large increase at this time.

The bimonthly data from Tables 1.5 and 1.6 show three broad trends. Effort, as measured by the length of line, distance travelled, number of traps and trap checks, and area utilized, continues to increase throughout the season. This results in an absolute increase in the harvest (number of foxes caught) but the yield per unit of effort (as measured by fox per trap check and fox per square mile) tends to diminish. Invariably the number of foxes taken in March and April is greater than the number taken in January and February, and this may be due to increased fox activity, the return of foxes from the sea ice, the mid-winter extension of the traplines, or some combination of all three. The fact that the return per trap check shows a marked decline through the season (except in very poor years when heavy spring runs occur) and that the yield per unit area data, although ambiguous, exhibit a similar tendency, suggests that the more intensively used areas closer to the village have experienced considerable trapping pressure by the end of the season. These areas are apparently not overtrapped as they continue to provide a good harvest with each cycle, but as the data suggest that further pressure would bring little extra

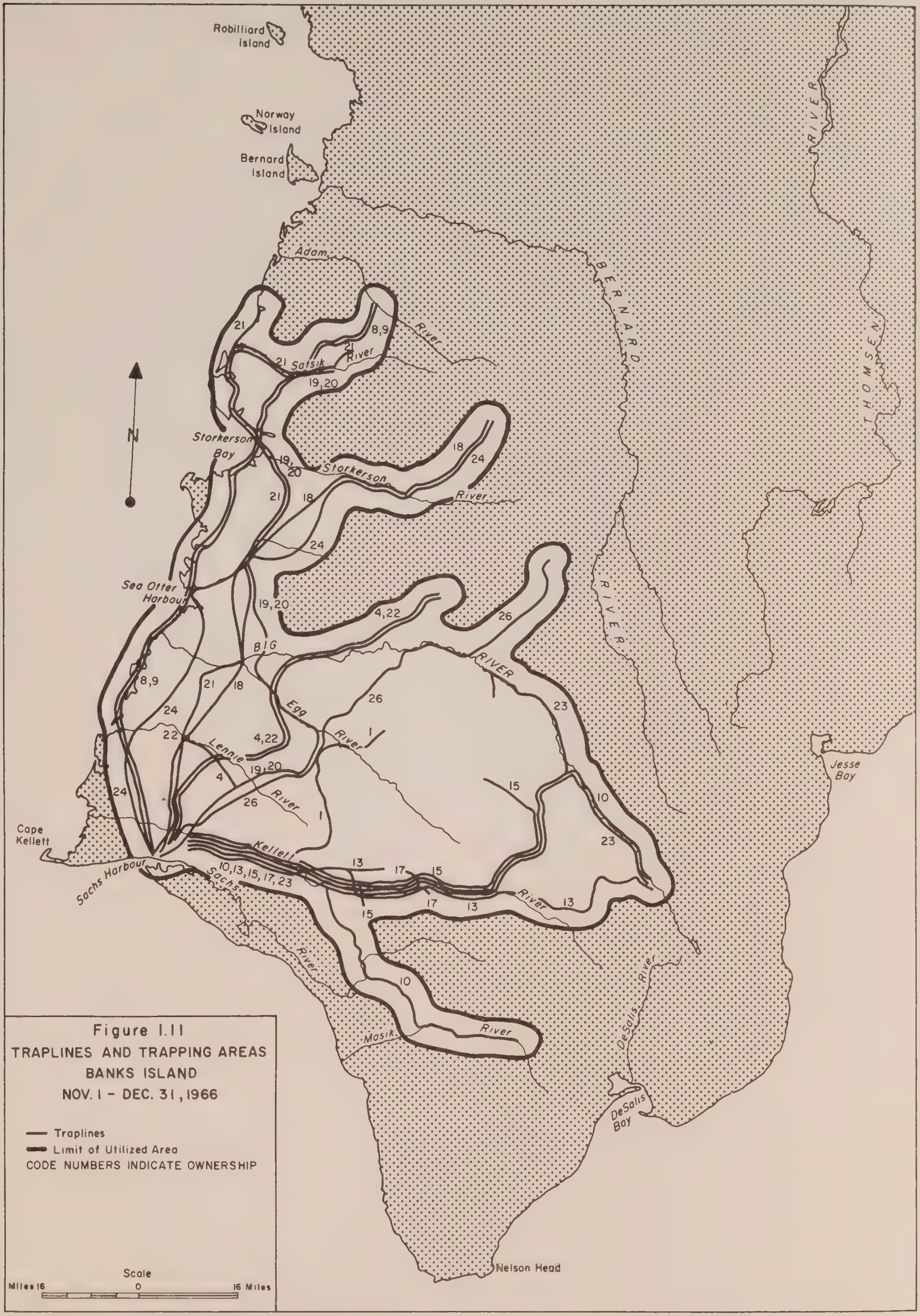


Figure I.11
TRAPLINES AND TRAPPING AREAS
BANKS ISLAND
NOV. 1 - DEC. 31, 1966

— Traplines
━ Limit of Utilized Area
CODE NUMBERS INDICATE OWNERSHIP

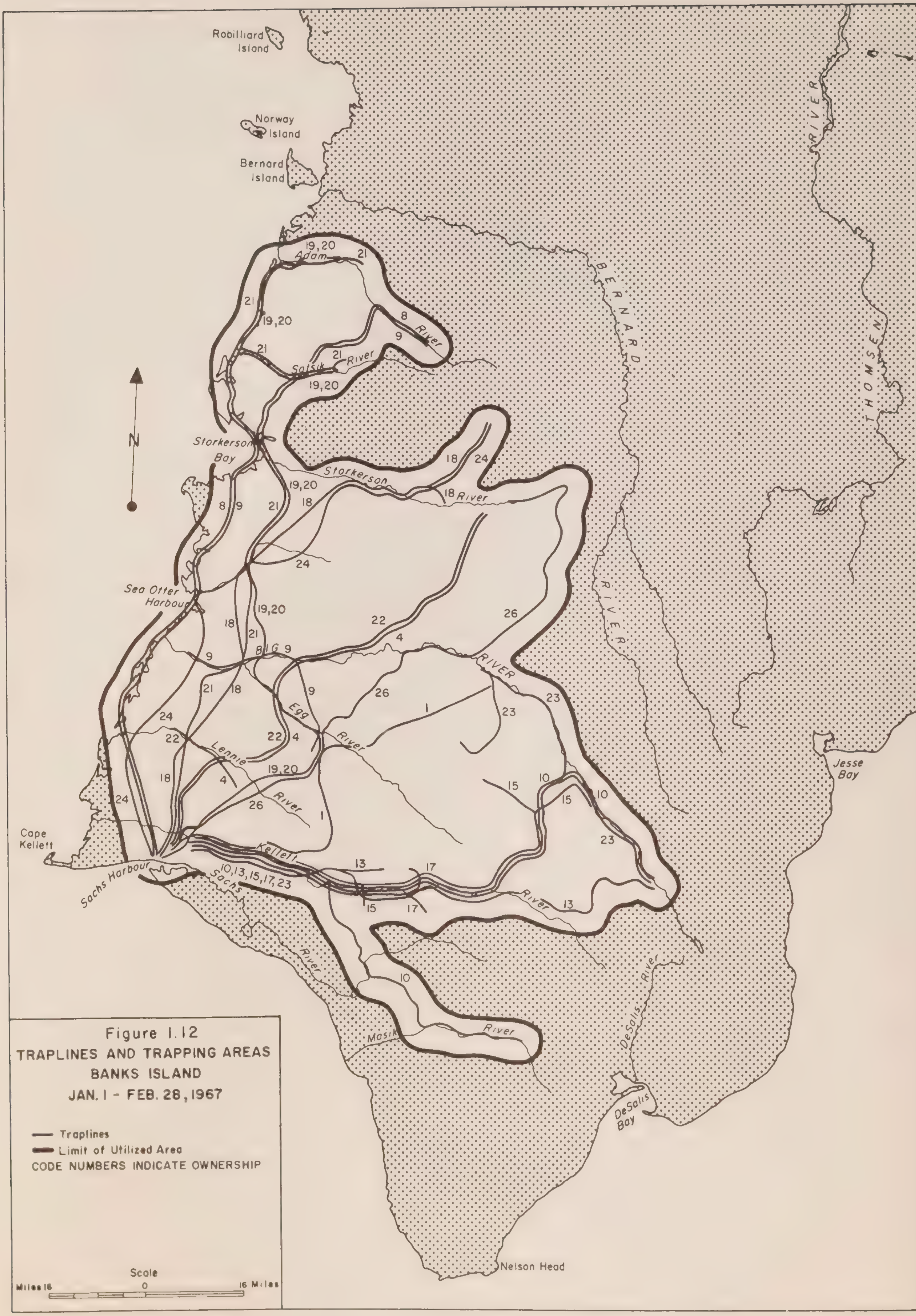


Figure 1.12
TRAPLINES AND TRAPPING AREAS
BANKS ISLAND
JAN. 1 - FEB. 28, 1967

Figure 1.13
TRAPLINES AND TRAPPING AREAS
BANKS ISLAND
MAR. 1 - APR. 15, 1967

TABLE 1.5

Variations in effort expenditure during the trapping season by bimonthly intervals, Banks Island, 1966-67, by per cent.

	1964-65			1965-66			1966-67			Three year mean		
	N-D	J-F	M-A	N-D	J-F	M-A	N-D	J-F	M-A	N-D	J-F	M-A
1. Foxes retrieved	9	23	68	31	29	40	46	28	27	38	27	35
2. Miles of line	54	98	100	62	92	100	82	93	100	66	94	100
3. Traps set	64	98	100	70	92	100	81	95	100	73	95	100
4. Trips	26	36	40	28	33	39	39	24	37	31	31	38
5. Days out	29	39	32	29	39	32	48	25	27	35	34	31
6. Distance travelled	19	38	43	23	35	42	38	23	39	26	32	42
7. Trap checks	14	37	49	19	34	48	33	27	40	22	33	45
8. Days per trip	+9	+9	−9	0	+15	−15	+20	+7	−27	+8	+8	−15
9. Distance per trip	−28	+8	+11	−21	+6	+10	−4	−1	+6	−17	+4	+9
10. Miles per day	−35	−2	+29	−23	−8	+31	−21	−9	+43	−25	−6	+34
11. Trap density	+18	0	0	+13	−3	0	0	+2	0	+11	0	0
12. Retrieved fox per trap check	−38	−38	+41	+65	−9	−19	+39	+2	−49	+38	−6	−18

Rows 1, 4 – 7: sum of three intervals = 100%.
Rows 2 – 3: third interval = 100%, other intervals shown as proportion of this.
Rows 8 – 12: percentage variation about annual mean.

Source: Table A.5

TABLE 1.6

Areal extent and yields of trapping, by bimonthly intervals, Banks Island, 1964-67

a. Extent of trapping area in square miles (proportion of spring total in brackets)

	Nov.-Dec.	Jan.-Feb.	Mar.-Apr.
1964-65	3260 (57%)	5560 (97%)	5730
1965-66	5780 (63%)	8670 (94%)	9180
1966-67	5170 (80%)	6250 (97%)	6460
Three year mean	4740 (66%)	6830 (95%)	7240

b. Foxes retrieved per square mile (bimonthly breakdown)

	Nov.-Dec.	Jan.-Feb.	Mar.-Apr.
1964-65	.04	.07	.18
1965-66[a]	.16	.10	.13
1966-67	.76	.38	.32

[a]Approximate: data from 15 trappers adjusted for 16.

c. Foxes per square mile (per full season)

	Total	Retrieved
1964-65	.31	.27
1965-66	.36	.32
1966-67	1.51	1.34
Three year mean	.73	.64

yield, it may be concluded that a significant expansion of trapping effort within an approximate radius of 50 miles of the settlement could result in the sustainable yield of that area being exceeded. Were the trap lines not extended in midwinter, an even more drastic decline in the yield per unit of effort would occur. These extensions are designed to offset the decline close to the settlements; that they do so only to a slight extent indicates that the trappers cannot extend their lines far enough, or do not care to do so. In any case, the first two months of the season are the most critical for the trapper, as the return on his effort is so much higher. The penalty for reduced efforts in midwinter and even late winter is less harsh than for failing to have got a good start on the season, although again the very poor year appears to be the exception.

Annual variations in effort

On the basis of a preliminary analysis of the 1964-65 data, it was suggested that trapping effort would be greatest in a peak year when good early season performance would encourage the trappers to redouble their efforts (Usher, 1966:52, 54). The hypothesis was that effort tended to be a function of animal

availability rather than pelt price (ibid.: 58). The present data do not offer much support for this view, and indeed suggest that the determinants of effort may be rather complex. In fact, during the period under consideration, maximum effort occurred in an average year, and in the peak year, far from a redoubling of effort, fewer extensions were made after Christmas than in any other year.

One must first consider the knowledge the trapper has at hand on the first of November when he sets out on his line. He knows with reasonable certainty whether the forthcoming season will be good, bad or indifferent, and to some extent whether he can expect the major part of his catch in the fall or in the spring. He is also aware of the approximate current price level of white fox, and he may suppose that this will not alter very drastically during the year. Thus although the trapper cannot be clairvoyant, neither is he blind. In addition, he has certain economic obligations or goals, which vary from year to year, and which may influence the planning of his trapping programme. Finally, he is aware of which strategies with regard to effort output and location of line are most appropriate to the circumstances.

In the autumn of 1964, the outlook for both fox abundance and pelt price was poor, although an upturn in the cycle was overdue. The situation was complicated by the fact that no boat had been able to reach the settlement that summer, and an airlift had been organized for early December. Most men were unable to leave the settlement at this time, and trapping effort was thus necessarily reduced. How much so is open to question, but both total effort and yield per unit of effort were extremely low. The lines were considerably extended after Christmas, and runs brought improved trapping in the spring, although both the total effort quotient and catch remained low for the year as a whole.

The following year brought improved prospects for the catch and particularly for the market price. Indebtedness had been growing for several seasons, and 1964-65 had been particularly catastrophic. Individual economic obligations were therefore unusually large. Although the season did not start until November 10th, considerably more effort was put into trapping during the first two months than had been the case the previous year. During the midwinter period, significant extensions were again made to the lines, and interestingly enough the numerical increments in miles of line, traps set and trap checks were very close to that of the previous year. Effort and catch for the full season of 1965-66 rose considerably above the previous year, although yields per unit of effort were up only slightly.

By the autumn of 1966 it was evident that the forthcoming season would be one of unusual abundance, and moreover fox prices appeared to be steady. There was marked enthusiasm and determination to get out on the trail and do well on the first trip. Accordingly, effort quotients were extremely high for the pre-Christmas period, and the harvest was an unexampled success. Post-Christmas line extensions were minimal however, and the time spent on the trail, which usually increases during January and February, was well below the pre-Christmas figure. Several factors appeared to be at work. The unusual effort expenditure in the early part of the season may well have reached the maximum possible level, or even surpassed what could be sustained over the season. Hard work on the trail and a minimum stay at home between trips had demanded considerable energy from men and dogs. When foxes are in abundance, they are considered to be much more trap prone, and

trappers agree that less care need be taken setting traps in the fall. The appropriate strategy is to put out as many traps as possible on the first trip, with less regard to the finer arts of setting and baiting than would customarily be given. A higher effort quotient in terms of miles of line, traps and trap checks thus becomes much more feasible in a good year than in a poor one. Later in the year, however, it becomes less feasible to extend the line very far, because any given length of line requires much more work in a good year than a poor one. It is both more difficult and less necessary to run a long line at the peak of the cycle.

During the early winter of 1966, there was great elation over the harvest; to return from a trip with 100, 200 or even 300 foxes was cause for celebration. There developed, however some apprehension in the community that fox prices might decline from their current favourable level; with such an abundance of pelts a lot of money was seen to hang on this possibility. Therefore men and women alike worked through late December and early January to skin, stretch and flour as many pelts as possible for the January auctions. Most men delayed their departure on the third trip (normally one sets out as soon after New Year's Day as possible) on this account, and did not get away until after the middle of the month. Unfortunately this course of action proved an unsuccessful gamble. Due to difficulties in chartering an aircraft, the furs did not reach the auction houses in time (although prices did not change significantly at the subsequent auctions). Having delayed the third trip, it then became difficult or impossible for most men to squeeze in a full six trips for the year.

Finally, the early season success was followed, for some people at least, by a feeling that the winter's task had been largely accomplished: they had already obtained several hundred foxes each, which by any standard was a lot, and they could now relax. Several men visited the mainland in January and February which is normally unheard of during the trapping season. These trips sometimes involved business transactions and invariably a spree, although the former was always offered as the justification for the visit. The end result was a total effort quotient well below that of the previous year, although certainly better than that of 1964-65. The role of price levels in economic decision making will be discussed in more detail in the following chapters. It is sufficient here to note that, contrary to our original hypothesis, animal availability is not the chief determinant of the effort quotient; both price levels and the current status of household economic obligations also play an important role.

The bimonthly data over the years suggest that the effort quotient under the present technological regime is approaching its limits. It is very doubtful if the pre-Christmas effort of 1966 could be significantly exceeded, although if followed up by the January-February increments characteristic of the previous two years, the total quotient could perhaps be 10 to 20 per cent higher than that of the maximum recorded in 1965-66. As mentioned above however, there may be strategic impediments to such an increase. The chief limiting factor is probably the number of traps to be handled. There are many other parts of the Arctic in which Eskimos run trap lines as long or longer than those on Banks Island, but nowhere is the density of traps along these lines even approached. The most energetic trappers on the Island have handled 800 or 900 traps. Some of these men believe they could work up to 1,200 or more in some years using their present means of transport; others do not feel they could ever handle this many.

Loss factors

Two aspects of loss may be identified in trapping: loss of time and effort on the trail, and loss of foxes. The chief cause of time and effort loss is wind. Snow can begin to drift at eight to ten m.p.h. and at about 12 m.p.h. the men find it difficult or impossible to set traps, for under these conditions the light new snow placed over the trap will blow out. This snow cover, even though very lightly packed, will set sufficiently in a day or two to withstand subsequent winds, but it cannot be worked with during a wind, and if a wind blows up within a few hours of setting a trap, the snow may be blown out. In the first case, the trapper must bide his time on the trail, while in the second, the previous day's work may be spoiled. Under certain conditions, trappers can leave their traps open and expect drifting snow to cover in the depression in the mound, but generally wind is a detrimental factor. In 1966-67, five per cent of trail time (54 out of 1,136 days) was spent laying over, chiefly on account of wind.

More important is the loss of foxes which are caught, but for some reason are not retrieved or not sold. Foxes caught in the traps may be lost or damaged prior to retrieval due to three main causes. Generally, the most important is predation. When wolves were prevalent on the Island, their predation resulted in losses of 20 to 30 per cent of the catch (McEwen, 1956). Destruction by wolves has been negligible in recent years, due to their current scarcity in the region. Owls, weasels and even lemmings have been known to damage the pelts of dead foxes (although usually not irreparably), but the chief cause presently is cannibalism by other foxes.

Foxes can also escape from the traps, either by working loose a poorly toggled trap and running off, trap and all, or if their foot is not too far into the trap, by struggling so much that they break or chew their foot off. In 1966-67, out of the 1,071 foxes lost, 573 were damaged by other animals, 297 escaped by pulling out the trap, and 200 escaped by leaving their toes in the traps (one fox was accidentally dropped off the sled while travelling).

The total loss rate for the three year period was 11.1 per cent and variation although not great, was inverse with effort. Relatively speaking, this is quite a low loss rate as on the mainland rates of a third to a half of the catch have been reported (Abrahamson, 1963:71 and Brack and McIntosh 1963:13), although the variety of predators is greater there. Nonetheless a considerable loss is represented: over $3,000 even in such a poor year as 1964-65, while two years later the loss amounted to almost $25,000. Trappers try to cut their losses by checking their lines as frequently as they can. This is particularly critical when there are runs on, as the trappers consider foxes most likely to cannibalize under these circumstances. Several men, especially those with long lines, experienced severe losses towards the termini in November and December 1966, when runs were said to have been at their height. As mentioned, a longer line is ordinarily considered desirable, although when predation is high, the premium is on more frequent trap checks.

Individual losses show a fair correlation with many effort indices, especially those relating to line length and distance travelled. This is not surprising as losses and overall success are closely associated: the more foxes a man gets, the more he is likely to lose as well. Despite variation from two to 27 per cent between individuals in the last three years, loss rates seldom exhibit any clear association with other

factors. The exception is in 1966-67, when there were significant correlations (at the 95 per cent level) with length factors and with the number of traps, which reflects the experience of those men with long lines mentioned above. For the three year mean, the only significant correlation with loss rates was a negative one, with the number of trips, again as might be expected. Although some trappers at certain times could well reduce their losses, it seems unlikely that the general loss rate could ever be much under ten per cent with dog teams as the means of transport.

Even after the foxes are brought home, not all the pelts can be sold. Some may be unprime, others may be of very poor quality. When foxes are taken alive in the traps, they are skinned at the end of the day, but those already frozen must be taken home and thawed out before processing. When this is the case (as normally it is), it is not always possible to detect damaged or poor quality pelts until they have been thawed. It does not seem feasible to reduce the unsaleable fraction at present; such losses are inherent in the harvesting of a wild species. The handling and marketing of pelts will be discussed in more detail in Chapter Three.

Effort and skill

An analysis of effort inputs has shown that the number of trap checks is the one most closely associated with individual trapping success, although the number of traps is also highly correlated with it. Effort inputs related to time (days out, number of trips) proved not nearly as important as the amount of equipment used and the frequency with which it is checked.

The very strong association of trap checks with success suggests that manual trapping skills and knowledge of fox habits are not of paramount importance in trapping. The two are not completely dissociated: running a lot of traps requires not only hard physical work but organizational ability and manual skill, as well as knowledge of travelling techniques and the local countryside. No novice could run 1,000 traps no matter how hard he worked. Yet big catches are invariably made by the younger, better equipped and more energetic trappers. The older men, who despite their superior knowledge and skill are less swift and handle less equipment, cannot match the younger trappers in gross production. A relative measure of skill and knowledge is provided by the parameter "foxes caught per trap check" (see Tables A.2 and A.3).[1] It may readily be seen that variation in effort inputs varies far more than skill amongst the individual trappers. Correlation tests show no consistently significant relationship between trapping skill and success. The real master trapper will get a few extra foxes every trip that an inexperienced man would not have caught, other things being equal. The premium however, must be on setting a large number of traps and checking them with frequency and swiftness.

The effort quotients (and accordingly the catches) of the top trappers on the Island are probably close to the maximum possible under the present technological regime. It is unlikely that even the most enthusiastic trapper can or will regularly spend more than 60 or 70 per cent of the season on the trail. Further increases in speed and skill in travelling and trapping can only be marginal, and the number of

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[1] When the trappers are ranked by this parameter (in any given year) the result is fairly close to the trappers' own assessment of each other's skills.

traps used is now limited by the ability to handle them, and certainly not by inability to afford their purchase. A thousand traps, 250 miles of line, six trips a year, 10,000 trap checks – these are goals now within reach of the top men, and to which the rest can perhaps aspire, but their achievement would require supreme physical and mental effort so long as dogs are the means of transport.

CHAPTER TWO

HUNTING AND THE ANNUAL CYCLE OF ACTIVITY

April 15th brings an end to the trapping season, but not to the trapper's toil. His work merely enters a new phase with a different routine, but it is no less essential to his success as a trapper. The white fox alone does not provide a sufficient basis for a viable economy. There are other resources on the Island, which provide both man and dog with essential foods, and which are also a source of additional cash. The hard work, skill and capitalization that are essential to a man's success on the trapline are no less important to these adjunctive activities, which provide the basis of existence on the Island. In recent years it has become possible to import all food requirements, and theoretically one could live and trap without hunting at all. Yet the great expense of doing so, the preference for country meat as both human and dog food, and the absence of other demands on time in the offseason, combine to ensure that under present conditions hunting is an essential activity.

The chief economic fauna of Banks Island and its surrounding waters are (besides foxes), seals, caribou and polar bears. In this chapter, each of these animals, and the means of harvesting them will be examined in some detail, with a view to establishing the material and effort inputs required for the consistent achievement of certain harvest levels. Finally, animals of lesser economic significance will be discussed briefly.

Seals

The most important seal in Western Arctic waters is the ringed seal *(Pusa hispida)*. Seals are considered to be relatively plentiful in the region of Banks Island, although little is known of the north and east coasts. In past years, when the Eskimos lived in dispersed camps, they had no trouble obtaining seals locally, and sealing at such camps as Sea Otter and Storkerson was considered to be very good. Recently seals have been hunted exclusively along the southwest coast, and particularly in the vicinity of Sachs Harbour itself. The seals of the Beaufort Sea area apparently migrate over considerable distances, unlike those of the Eastern Arctic. The Bankslanders believe there is a small resident population which can in certain seasons be distinguished from the migratory or "travelling" seals, but the bulk of the harvest is considered to come from the latter population. In spring and summer seals appear to move north-westerly along the coast between Nelson Head and Cape Kellett. Whether they return in the opposite direction in winter is not really known; it is possible that the animals complete their migration by another route. There do seem to be fewer animals in the area at this time, although seals are in any case much more difficult to obtain in winter, as will be explained below. Seals that maintain breathing holes in the fast ice are thought to be in the resident population by the Bankslanders.

Due to the migratory nature of the seal population, it is not the Bankslanders' exclusive resource. It may also provide a livelihood to the Holman Eskimos, as well as to the mainlanders. The total seal population is unknown, and until the migration pattern is ascertained, so is the level of predation on it. Apparently there is no threat

of overexploitation, because the big catches throughout the region from 1963 to 1965 when prices were high, have not been followed by inadequate harvests.

The bearded seal (*Erignathus barbatus*) is also found in Banks Island waters. A large animal, it has recently amounted to two to nine per cent of the total catch along the southwest coast. It is a benthic feeder and inhabits shallow waters. The west coast of the Island thus provides a more suitable habitat than the southwest coast. "Ugyuks", as they are called by the Bankslanders, are reputed to be particularly plentiful at Sea Otter Harbour.

Many methods of seal hunting have evolved in the North American Arctic. These vary regionally, and even from one community to another. This is partly due to differing resource bases, economies and technological development. But seal hunting is intimately associated with sea ice; its presence or absence and particularly its form. The relationship between sea ice and seal hunting has been described for many parts of the Arctic, perhaps best by Nelson (1967) and Haller (1967). A summary account of ice conditions on the coasts of Banks Island, particularly the southern and western shores, must precede the discussion of hunting.

Sea ice

In winter, all waters immediately adjacent to Banks Island freeze over. This ice, known as fast ice, is attached to the shore. Tides in the region are less than two feet, and true tide cracks do not exist. The fast ice is generally quite smooth, except when old ice is not completely melted during the previous summer, or when a fall storm breaks up young ice. Although cracks may open occasionally and quickly refreeze, the ice remains stationary and there is no accumulation of pressure ridges. At Sachs Harbour, winter ice reaches a thickness of over 80 inches (plus or minus 10 inches) in late May.

West of Banks Island beyond the fast ice, lies the permanent polar pack. Its edge may vary, with season and winds, from 20 to 100 miles off shore. In winter there is usually a lead between the pack and the fast ice. The position of this lead can be identified up to 20 miles away in overcast conditions by its dark reflection on the cloud cover.

Amundsen Gulf is often characterized by moving consolidated pack ice, especially in late winter. Leads form and then freeze over, but substantial bodies of open water may develop temporarily. Again, ice conditions may be "read" from afar by differing reflections on the cloud cover. Moving pack ice is especially common between Nelson Head and Cape Parry, due partly to strong currents. M'Clure Strait, Prince of Wales Strait, and the southeast coast are frozen solid during the winter.[1]

Break up in the Beaufort Sea – Amundsen Gulf area is controlled by several factors, including the movement of the polar pack, currents in the Beaufort Sea Basin, winds, and temperatures. The pack southwest of Sachs Harbour usually begins to disintegrate in May, and the absorption of solar radiation by the open water considerably hastens the process of breakup. In most years the winter ice melts

[1] Maps of regional ice conditions may be found in the *Pilot of Arctic Canada,* Vol. 1, 1959.

completely. In unfavourable years however the main pack may not really break up and shift at all until late July or August, and dense concentrations of floes may remain throughout the summer, to be incorporated in the next year's ice cover. Occasionally, old ice from the polar pack enters Amundsen Gulf from the west.

The disintegration of the fast ice is in many respects unrelated to the breakup of Amundsen Gulf, and the two events are not necessarily simultaneous. The fast ice melts *in situ* from the top and bottom and is also subject to calving off at the floe edge. It also melts along the shore at the mouths of streams or rivers. In late May or early June, cracks begin to appear and widen in the fast ice, and later, puddles form on its surface. These seldom become deep, as the surface water is partially drained by the cracks. The distance from Sachs Harbour (which is somewhat indented from the general trend of the coastline) to the edge of the ice may be ten to 15 miles in mid-May and perhaps five miles a month later. At the more exposed coasts at Cape Kellett or southwest towards the Fish Lakes, the distances are correspondingly less. As the season proceeds, the floe edge becomes highly unstable and calving occurs frequently. Eventually the fast ice may break away right at the shore, first near the Masik River and later at Sachs Harbour. If in a previous summer the ice did not all melt, old grounded floes incorporated into the fast ice serve to anchor it and delay its ultimate breakup. In such a case the fast ice remains fixed to the shore, rotting slowly, otherwise it can break away close to shore relatively early.

Summer ice conditions in the vicinity of Banks Island vary from year to year. In most years Amundsen Gulf is largely ice free. In favourable seasons both the west coast and Prince of Wales Strait may also be ice free. Under less favourable conditions many floes will remain in Prince of Wales Strait, and the west coast may be so choked with ice as to render navigation impossible. M'Clure Strait is virtually never ice free, and is seldom navigable by ordinary vessels.

The period between the departure of the fast ice (usually early July) and the onset of new ice (early October) is considered the open water period. It is the time of year when boats are the only means of transport on the sea, although ice may still be present. Wind becomes the chief determinant of ice conditions at this time. One day there may be open water as far as the eye can see, but a wind shift can choke the area with broken ice in hours. When ice is present it is usually in the form of flat pans, some only a few yards across, others perhaps an acre or so in extent, accompanied by small debris ice resulting from the grinding of the floes one against another. Occasionally very large rafted pieces are present, which may be remnants of pressure ridges from the previous winter or shore formations built up by wave action in the fall. Except for large pieces that ground off shore, the ice is kept in constant motion throughout the summer by winds and currents.

Freeze-up commences in late September or early October in sheltered bays, and the landfast ice is generally complete within a month. A sharp drop in temperatures accompanied by calm weather can allow clear young ice to form rapidly and smoothly over large areas. On the other hand, gradual cooling and stormy weather cause a slower freeze up. Spray freezes on the beach and accumulates in ridges, while slush forms on the surface of the water near shore. The landfast ice is then formed by gradual accretion. Strong currents can keep the water open quite late at some locations, such as the south side of Kellett Sandspit.

Hunting Methods

At Sachs Harbour there are three basic methods of obtaining seals which may be termed fast ice, floe edge and open water hunting.[1] All three involve high powered rifles with telescopic sights. The most popular bores are .222s and .243s. Arctic literature abounds with descriptions of seal hunting and so discussion here will be brief.

In spring, seals commonly bask on the fast ice by their breathing holes. The hunter, travelling by dog team, can spot "hauled-ups" (basking seals) from as much as a half mile away, or even further if he is searching from a high vantage point. The dogs are left several hundred yards from the seal, and the hunter stalks to within perhaps 150 yards. A clean shot is required, as an injured seal will slide down the hole and be lost.

Floe edge hunting is common to most seasons. The hunter waits at the edge, watching for seals to rise for air. He has but a few seconds to spot the seal, aim and fire. Only the head surfaces, presenting a target about the size of a grapefruit. Most seals are shot within a range of 200 yards, although some kills are made from a considerably greater distance. Dead seals are prone to sinking in summer and this can be a source of considerable loss. Seals are retrieved with the aid of a small canvas covered plywood skiff. When the ice is still fast to shore, one travels to the edge by dog team. Later in the year when large pans are floating loose in the sea it is customary when hunting by canoe to use such floes as shooting platforms. In this case retrieval is effected by powered canoe and there is no need for the skiff.

In some summers, when there is little or no ice in the vicinity, hunting is done from outboard powered canoes. Running on low power, one simply sits in the canoe looking for seals. Normally they are swimming, and one waits for them to surface, as in floe edge hunting, but occasionally a seal will be seen basking on a small pan. In this case it is approached and fired on as in spring hunting on the fast ice.

Seasonal influence on hunting methods

Each of the above methods can be characteristic of the different seasons, but under certain circumstances may be used in combination on any given hunt. The pattern and productivity of seal hunting varies somewhat from year to year, being mainly a factor of ice conditions. The general pattern is as follows.

Spring sealing usually begins in early May, after the men have had a chance to relax from the last trapping trip, and continues for six to eight weeks. Spring is also the season when the men take their families camping. During the last two weeks in May, most families go to the Fish Lakes for a week or two. The women jig for fish, and the men go out on the sea ice to hunt seals. The days are long and relatively warm, the geese begin to arrive, and usually the weather is fine enough for children to play and the women to sit out fishing for long periods in comfort. For them especially, this is a welcome holiday after being cooped up in the houses over the long winter. Later, in June, some families go to sealings camps either at Mary Sachs

[1] Two or three Copper Eskimos place seal hooks in breathing holes very occasionally in winter, as is the custom in their former land. No seals were obtained this way in 1967.

or near the Fish Lakes. This is partly because the floe edge is closer to shore at these points, and also because following the thaw, the ground around the houses in the village is very wet, and many people prefer to camp out on the well drained shingle beaches until the village is more habitable.

Most seals are taken at the floe edge during the spring months. Men go singly or in parties, by dog team, usually for no more than 18 or 20 hours as their camps are so close at hand. If there is a group, some men will nap, make tea or boil meat periodically, but there will always be at least one man on watch for seals. Of all the resource harvesting done by the Bankslanders, this is the most communal. There is some sharing of the proceeds of the hunt, and the men enjoy both the comradeship and the competition inherent in the group endeavour. Sometimes men hunt alone at the floe edge, which is probably more efficient, but normally two or three go together. Sometimes there may be six or eight men within 200 feet of each other, but their deployment is flexible, as at any time one or two of them may decide to go a half mile further along to see if their luck will improve.

A few seals are taken at their breathing holes in spring, but this method is generally not as productive as floe edge hunting. Men are always on the look out for "hauled-ups" when travelling to and fro on the ice. Later in June, floe edge sealing is best at night when the sun is low, as more seals seem to appear then, while at the height of the day, one is best hunting "hauled-ups", which have come out to bask in the warm sun. In some years, it is possible to hunt "hauled-ups" on the fast ice after the floe edge itself has become unsafe. Finally, some men load their canoes and outboards on their sleds and take them to the floe edge to engage in open water hunting. Thus all three hunting methods may be used in the spring, although floe edge sealing is by far the most common.

Depending on the manner of break up, there may be a brief hiatus in seal hunting when it is impossible to travel by either dog team or canoe. This usually occurs close to or over the Dominion Day celebrations which in a sense mark the beginning of a new economic year. Dog teams are tied up for the summer, and seal hunting begins with a view to putting up food for the winter ahead.

In canoe hunting, men usually go singly, but occasionally in pairs. The distance travelled from the settlement is governed chiefly by weather conditions (men seldom go more than five miles off shore for fear of being caught in a sudden storm), and the fact that seals are usually plentiful enough within a few miles of the settlement so that there is no reason to go further. Rather than going to any one spot, the hunters move around, seeking concentrations of seals. Such trips may last as long as 18 hours but are usually much shorter. Sometimes the men may come into shore at Kellett or near Fish Lakes and camp for the night, and go off again to hunt the next day. If there is ice, the hunts usually last longer and are more likely to involve camping out for a night or two. The men move from floe to floe, staying perhaps one hour, perhaps twelve, depending on their luck, and of course they are also alert for seals while travelling in their canoes. Again, larger groups may gather on a floe, and the atmosphere and routine is very much like spring floe edge hunting. Most hunting is done to the west of the settlement in the vicinity of Cape Kellett. Ice, when present, is normally closer to shore there than at Sachs Harbour, and this is thought to concentrate the travelling seals closer to the beach. Wind is an important

consideration in summer hunting (viz. McLaren 1961a). Sachs is on an exposed coast, and the Beaufort Sea can be quite stormy, particularly in late August and September. On really rough days, canoe hunting is impossible, but even if the water is only riffled, the possibility of sighting seals as they surface is considerably reduced. McLaren has calculated that under ideal conditions, a seal can be seen from about one third of a mile distant (1961b: 163), while Foote has estimated that waves six inches high will reduce visibility to less than 150 yards (1967b: 111).

Observations kept at Sachs Harbour between July 13th and October 4th, 1967, indicated that 49 out of the 83 days were unsuitable for hunting due to high winds. This problem was particularly acute in September, when 27 days were too windy. The presence of ice, however, can mitigate the effects of wind. During July and August, for example, when it was windy at the settlement it was sometimes possible to go into the heavy ice off Cape Kellett and find virtually calm waters. On the other hand, in September the ice had moved out of the vicinity and there was nothing to afford protection from the winds.

By mid September, most men have obtained a sufficient supply for the winter, and sealing virtually ceases until the following spring. Formerly some men were in the habit of going down to Kellett Sandspit by dog team in mid October for a few days to hunt seals, as the currents keep the water open late there, and they obtained much of their winter supply at this time. Recently the universal acquisition of large canoes and outboards has made summer hunting much more productive, and the fall hunt has become unnecessary.

Winter hunting is exclusively of the floe edge type. Dogteam travel on the sea ice can begin in late October or early November, although the margin itself is still wet and spongy. It is bitterly cold at the floe edge in winter, yet one must lie still in wait, watching for seals through the smoke rising off the water in the dull twilight. If a man has not put up a sufficient food supply, he will have to hunt at times during the winter, but in recent years this has seldom been necessary. Nowadays, if the weather is good and open water appears, a few men do go out, but this is more because the opportunity has presented itself rather than through necessity.

Production and consumption

Table 2.1 shows the annual seal harvest since 1955. Individual catches vary considerably depending on skill, inclination and equipment. In recent years, the better hunters have consistently obtained at least 75 or 80 seals. This easily meets dogfeed requirements and greatly exceeds the need for byproducts. From 1963 to 1965 seal skins were at a high value, and in the year 1964-65, both mean value and volume of seal skins produced per hunter exceeded the corresponding figures for foxes for the first and only time in the experience of Bankslanders. Since then, skins have occasionally been sold, but this represents an effort to maximize the benefits from a resource harvested chiefly for food. Current price levels provide no incentive to hunt seals commercially.

Seal meat is always used in combination with cornmeal for dogfeed so that total requirements can be quite flexible; the more seals obtained, the less cornmeal

TABLE 2.1

Annual seal harvest, Banks Island, 1955-67

Year	Number of seals[a]	Number of hunters[b]	Mean take per hunter
1955-56	570	7	81
1956-57	310	5	62
1957-58	500	11	45
1958-59	205	13	16[c]
1959-60	615	16	38
1960-61	920	19	48
1961-62	934	19	49
1962-63	1025	18	57
1963-64	1125	18	63
1964-65	2599	18	144
1965-66	1298	19	68
1966-67	1268	17	75
Means	947	15	63

[a]Approximate figures in most cases. Totals generally include bearded seals, which may vary from two to nine percent of the total catch (the average is about four percent).

[b]Does not always coincide with the number of full time trappers (Volume One, Table A. 5), as sometimes different people are involved in each activity.

[c]There is no apparent reason for this low catch. The total harvest figure is probably incomplete. All figures before 1960 may be of limited reliability.

Source: R.C.M.P. Annual Detachment Reports, Sachs Harbour; field investigations.

required. The economics of this will be discussed in the next chapter. For the present, eighty seals may be taken as a desirable annual catch per hunter.

The seasonality of the harvest is shown in Figure 2.1. The importance of the May-September period, and particularly the two months July and August, is clear. Although there is some variation from year to year, the basic pattern is the same. The intense summer activity reflects at once the coincidence of greatest opportunity for hunting, ease of hunting, availability of seals and the need for dogfeed. Opportunity costs are also lowest at this time.

A distinct seasonality in seal meat requirements for dogfeed also exists, and is not coincident with the harvest. Basically dogs are fed every night except from mid June to mid October when they are fed every second night. There are approximately 300 feeding nights per year. A team of nine dogs, (which is the average at Sachs Harbour), requires half a ringed seal at every feeding (about two pounds per dog) or 150 per year, if the dogs are fed solely on seal meat. However, seal meat can be mixed and cooked with cornmeal or oats, in which case only one half pound of meat per dog is required.[1] Used in this way, one seal lasts for ten feeding nights and a minimum of 30 seals are required per annum. Between these two extremes, any

[1]See Appendix D for weights and utilization of seal carcases.

Figure 2.1
PERCENTAGE DISTRIBUTION OF THE ANNUAL SEAL HARVEST
BY MONTH
BANKS ISLAND, 1964-67

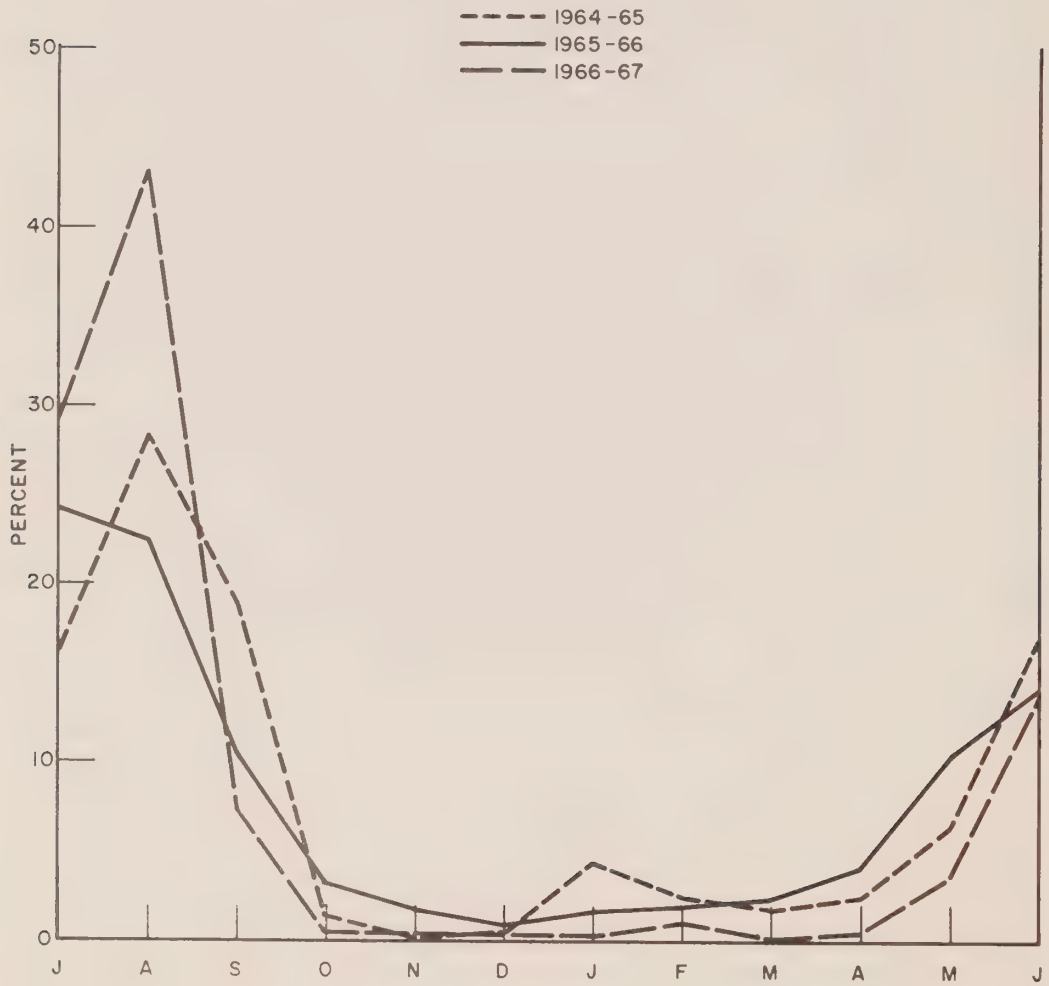


Figure 2.2

RELATIONSHIP OF THE NUMBER OF FEEDING NIGHTS IN WHICH DOGFEED MUST BE COOKED TO THE TOTAL NUMBER OF SEALS OBTAINED

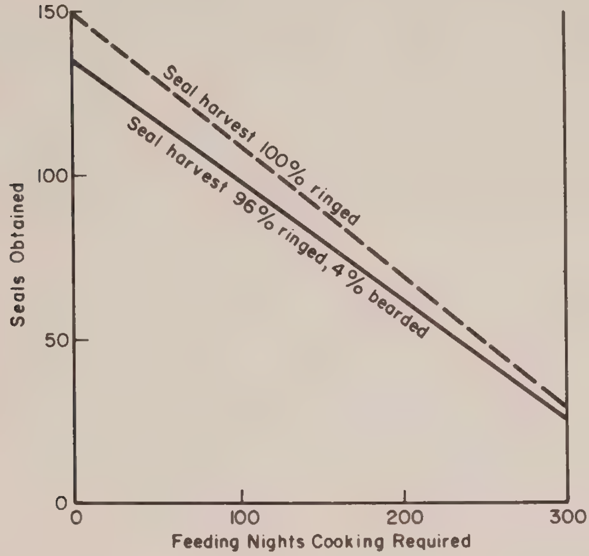
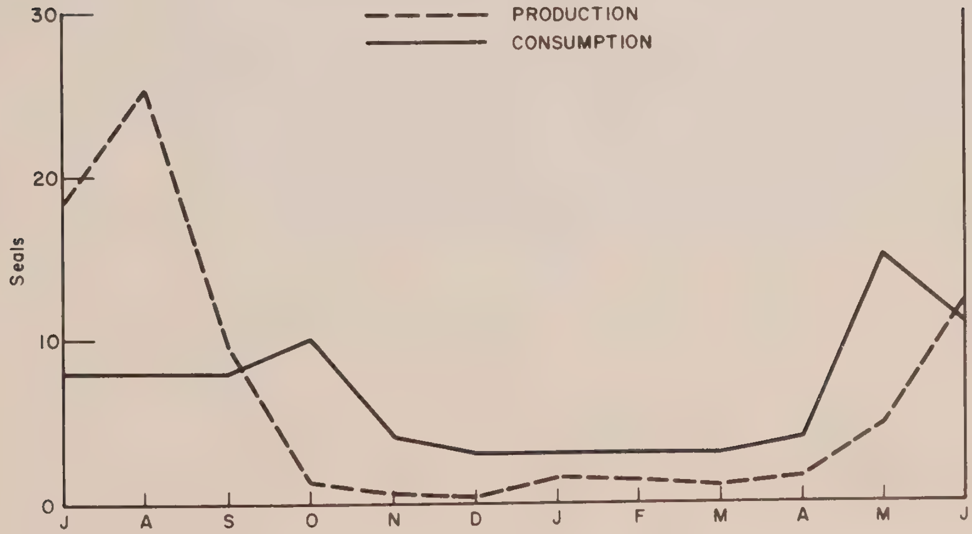


Figure 2.3

PRODUCTION AND CONSUMPTION OF SEALS BY MONTH BASED ON AN ANNUAL HARVEST OF 80 SEALS



combination of cooked and raw feed over the year will require an intermediate number of seals, which can be calculated from Figure 2.2.

These calculations apply to ringed seals only. In order to relate catch statistics to feed requirements, it is necessary to remember that the seal harvest figures include bearded seals, in addition to ringed seals. If, on the average, four per cent of the catch consists of the larger bearded seals, the total meat yield will be over ten per cent greater than from a harvest of ringed seals only. The effect of the bearded seal component on the feed requirements as measured in seal units is shown in Figure 2.2. The figure of 80 seals used above as a desirable average catch includes this component of bearded seals, and provides the equivalent meat yield of about 90 ringed seals.

The actual feeding pattern begins with nightly feeding in mid October, and between then and the opening of trapping season two weeks later, the men begin to cook dogpot. The trappers generally cook every night while on the trail, and some or most nights while at home, until about the end of April. The dogs are then fed raw meat every night until mid June when they revert to alternate night feeding.

The practice of cooking dogfeed is an old one, probably introduced by white trappers around the turn of the century. The light weight and imperishability of cornmeal or oats are great advantages for long distance travel and long term caches, and they make inexpensive substitutes when meat is scarce. Moreover, the trappers consider it good for dogs to have a warm meal in winter instead of a regular diet of frozen meat. Cornmeal is thus essential on the trail, and in any case, very few hunters can or wish to obtain the 130 or more seals which would be required in the absence of any other food. On the other hand, one does not want to cook every night, since hunting seals for raw feed is easier and more enjoyable, especially when seals are readily available. The feeding pattern outlined above involves cooking for about 150 nights, or half the total feeding nights of the year. This combination requires 90 ringed seals, or about 80 seal units counting bearded seals.

Figure 2.3 shows the mean annual production – consumption cycle by month for a hypothetical household (one hunter, nine dogs, 80 seals). The production cycle is derived from the 1964-67 three year mean (Figure 2.1), and the consumption cycle from the normal feeding pattern. Paradoxically consumption requirements are greatest when the dogs are idle, and lowest when they are most productive, although generally consumption reflects production. July and August are months of great surplus, June and September of slight surplus, while the rest are deficit months.

The nature of the summer surplus is particularly interesting. From May until about mid August, seals are fed to the dogs within a short time of slaughter. During the warmer days, carcases will eventually putrefy if left on the beach, although a few men have shallow pits or cellars in which to store seals (most ice cellar space is reserved for human foods such as caribou, geese and fish). The production rate exceeds requirements however, and a surplus is gradually built up during the summer. Later in August, as cooler weather prevails, seal carcases will keep fairly well in the open air. The animals are also putting on fat and a carcase may at this time yield ten pounds more blubber than five or six weeks previously (see McLaren, 1958: 63). The trappers, having a cushion of a few weeks' dog feed, can now take advantage of improved storage conditions and the increasing fat yield to begin

accumulating the winters' feed supply. Thirty seals is an acceptable minimum to maintain a team from October to April, and anything above this amount will diminish the frequency of having to cook dog feed in winter. Seal hunting is thus quite intensive in late August and early September. As mentioned in the previous chapter, some men go sealing at Sea Otter Harbour in early September and cache seals there. Ordinarily it is quite feasible to obtain the requisite supply before unfavourable sealing conditions set in September.

Two additional facts must be noted before closing this discussion. First, there is virtually no waste of harvested seals, and it is therefore legitimate to assume that 80 seals harvested means 80 seals consumed. Secondly, there are occasionally other sources of dog feed which can be significant, such as foxes, rabbits and rutting bull caribou.

Inputs and Efficiencies of Seal Hunting

The chief technological items required in seal hunting, aside from the rifle, are the means of transport, which are twofold: the dog team and the powered boat. The first requires no additional investment as it simply maximizes the use made of an already existing and necessary facility. The second however, requires a major investment and has little additional utility. If seal hunting were not essential, there would be no need for large boats and powerful motors and less need for each man to have his own boat. Yet the summer period is when the greatest number of seals can be obtained with the least time and effort and at the lowest opportunity cost. Although summer sealing requires a canoe and outboard, the trappers consider the depreciation, maintenance and operating costs involved are more than offset by higher productivity achieved during the trapping season due to the assured supply of dogfeed.

Capital equipment and investments will be discussed in detail in the next chapter. An indication of the expense of summer hunting is the fact that in 1966 the hunters were using 20 foot canoes with engines of a mean rating of 13½ horsepower. The latter was a considerable increase over the 1964 figure, and yet many hunters were talking in terms of 22 foot canoes for greater loads, and 18 and 20 horsepower engines for greater power and speed.[1] Gasoline and oil costs are also an important consideration.

A less important expenditure, but one common to all types of hunting, is ammunition. This understandably varies from one season to another. For example fast ice hunting involves shooting at a stationary target from a fixed platform, floe edge hunting a moving target from a fixed platform, and open water hunting a moving target (although occasionally a fixed one) from a moving platform.

The reports of hunters and direct observations of hunting expeditions provided data which enable direct comparisons of the inputs and efficiencies of seal hunting under various conditions (see Appendix C). All information relates to floe edge sealing as ice conditions favoured this method during virtually the entire period of field study. A comparison of winter, summer and spring floe edge hunting is given in Table 2.2.

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[1] An element of sport and prestige is also involved.

The number of seals observed per hour tend to confirm the impression that fewer seals are present in the winter months, even though the winter figure may be a somewhat low estimate. The data are not strictly comparable, however, as visibility conditions are neither uniform from hunt to hunt nor season to season. Darkness reduces visibility in winter and fog can do so in all seasons.

The loss rate is lowest in winter. In spring and early summer, changes in the specific gravity of seals and in surface water salinity make loss through sinking an important consideration.

TABLE 2.2

Comparison of winter, spring and summer floe edge hunting efficiency, expressed as ratios per seal retrieved

	Winter	Spring	Summer
Number of seals observed	1.4[a]	2.7	3.9
Observations per hour	0.45[a]	1.63	1.62
Number of seals shot at	n.d.	2.1	1.8
Number of shots fired	n.d.	2.5	2.8
Seals shot	1.1	1.5	1.4
Seals sunk	0.1	0.5	0.4
Potential hunting time[b]	2:51	1:39	2:23
Travelling, time[b]	1:26	0:03	0:36
Total time[b]	3:56	1:41	2:38
Gasolene (gals.)	nil	nil	2.1
Oil (qts.)	nil	nil	0.36

[a]Approximate, possibly an under estimate.

[b]Measured in hours and minutes. Potential hunting time includes time spent stationary in watch and also while travelling in open water or along the floe edge. Travelling time includes the latter plus travel to and from the settlement or camps, in areas where hunting is impossible. There is some overlap between potential hunting time and travelling time, so that the total of the two exceeds the figure for total hunt time.

Source: Appendix C.

Observational data on the number of shots fired show little difference between spring and summer floe edge hunting, as would be expected. The ratios are not far from the figures of 3.5 given by Haller for Cumberland Sound (in Anders, 1967:158), and 3.2 given by Foote for East Baffin Island (1967b: 113). Fast ice hunting requires fewer shells per seal; open water hunting many more. Data given by Foote (ibid.:113-115) for East Baffin is probably representative of Sachs Harbour as well.

There is no apparent reason for the much higher ratio of seals shot at to seals seen in spring than in summer, nor can it be said whether this is typical. It is however, the main reason for the differential between spring and summer in time

required per seal retrieved. If the difference is merely due to chance, it would be legitimate to average them and conclude that approximately two hours hunting time is required per seal. In fact this is probably the case. If the figure of 3.5 seals retrieved per hunt in the summer of 1966 were representative, it would have necessitated 28 trips per hunter, where as in fact most men probably went out 20 times or less. Travelling time is relatively unimportant in both seasons. Winter hunting time requirements are not much greater, due mainly to the lower loss rate, but travelling time is significant so that in terms of total time, winter hunting is considerably less efficient.

It is important to note that the data in Table 2.2 apply to hunting as a collective endeavour. This complicates the question of measuring productivity by "units of effort", as McLaren has suggested for the Eastern Arctic.[1]

Individual productivity should (and almost certainly does) decrease with the number of people hunting in close proximity, especially in floe edge sealing. If three men went hunting for ten hours together in the spring, they would, according to Table 2.2 see about 16 seals. They would shoot at 12 of these (using 15 rounds of ammunition), killing perhaps nine, and retrieving six. They would split the catch and each man would go home with two seals for his day's work. Suppose however, that only one man had sat by that same spot. He would not have seen only one-third of the seals; very possibly he would have seen all 16, and if he did not attempt to kill 12 of them, he probably would have tried for at least 10. Had he been with the others, he could not have made as many attempts himself. Frequently all the hunters sight a seal simultaneously. Sometimes two will fire at the same time, but usually if one person gets a quick shot away the others make no attempt, for of course the seal is either already dead or has dived below the surface. In the latter case there may be a second chance if the animal resurfaces within shooting range, but this does not always happen. Alone however, our hunter gets more chances and uses fewer rounds altogether (although they are all his own), because there is no possibility of two or more simultaneous shots. Data are lacking on the relative efficiency of collective versus individual hunting, but there are no *a priori* grounds for believing that there is a significantly greater chance of three hunters killing a seal once it has been sighted and is within shooting range than one man alone. Theoretically if each man scores on every second shot, it follows that if three shoot simultaneously there is only one chance in eight that all will miss. Usually only one man gets to shoot however, and if anything his aim is less sure because of the competition. Alone, a man may have several seconds to aim while the seal is surfacing, while in a group he is also racing against the fastest shot – which can occur within a second or two of sighting. Our lone hunter can thus expect to kill the same percentage of seals he shoots at as did the group, or nearly so. The sinking rate is the same, and thus the lone hunter has every possibility of going home with four or five seals. Under identical circumstances then, catch per unit of effort (i.e. hunter-day in McLaren's terms) can vary severalfold depending on the number of hunters involved.

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[1] An assessment of seal hunts by number of seals per hunter per hour (or day), with no differentiation according to the number of hunters involved (1958:89).

TABLE 2.3

Theoretical catch per hunter per day, Sachs Harbour and selected Eastern Arctic locations

	Sachs Harbour	Arctic Bay	Padloping	Igloolik
Winter floe edge hunting	2.1	0.1	0.2	0.3
Spring floe edge hunting	7.3	0.9	1.3	1.7

With this reservation in mind, one can compare theoretical productivity on Banks Island with that of some Eastern Arctic points as determined by McLaren (1958) (See Table 2.3). The length of McLaren's hunting days are not defined; in order to make the comparison we must assume arbitrarily a length of six hours actual hunting time in winter, twelve in spring. Evidently summer hunting conditions at Sachs are not replicated in the Eastern Arctic, as McLaren gives no comparable indices. A winter catch per unit of effort of 0.22 seals per hunter per day per mid winter availability index[1] (for higher latitudes) is used in calculating the Eastern Arctic figures.

According to McLaren's catch per unit of effort indices (1958:47), at no season and with no method (except fast ice hunting) will a hunter be likely to get more than two or three seals per day on the average except in a few very favourable locations such as Cape Dorset. Indeed, Haller found actual productivity in Cumberland Sound even lower than McLaren's theoretical predictions would indicate (in Anders, 1967:81). At Sachs, on the other hand, average catches per hunter per day tend to be much higher than this in spring and summer, and indeed when conditions are ideal, individuals have been known to get 20 seals in a single day. Even larger individual catches have been reported from Holman.

There is clearly a great discrepancy in production between east and west, but it is due neither to the skill of the Banksland hunters nor to the richness of the surrounding seas. Far more likely, it is indicative of the migratory nature of the seal population. McLaren's availability index was designed for a non-migratory population. It is inapplicable to Banks Island where at any one point, given sufficient time, the population of a whole region passes within range. The extent and magnitude of these migrations are unknown, but in view of the difficulties of applying resource management techniques developed in the Eastern Arctic, the necessity for further research in the west is evident.

An important consequence of the seal migration and the resultant high catches per unit of effort is that travel distances in seal hunting at Sachs are relatively short. For example, Haller found that spring and summer hunting in Cumberland Sound involved distances of 14 to 24 miles travelled per seal landed (in Anders, 1967:68,

[1] A measure devised by McLaren (1958) to measure relative availability of seals to the hunter, based on seal population and the configuration of the coastline.

70). Under similar though not identical conditions at Sachs, these distances were much less. Probably under five miles per seal are required in spring floe edge hunting by dog team, and perhaps ten miles in summer boat hunting depending on conditions. In the summer of 1966, the 2000 gallons of gas used in seal hunting probably represented about 10,000 miles of travelling, or just over 10 miles per seal landed. Similarly, the area utilized is rather smaller than for Cumberland Sound camps. Figure 2.4 shows the sealing areas and currently utilized camps. The limits of sealing do not include the occasional hunting trips to Sea Otter Harbour. Probably over 90 per cent of all seals are taken within the area of intensive sealing. This area of about 200 square miles produces very large harvests – almost 300 pounds of edible meat per square mile. This does not reflect the productivity of the local waters of course, since the population is in transit.

Time costs in seal hunting

The seal migration, and the resultant possibility of harvesting large numbers in a very restricted area, allow the Bankslanders to hunt with a fairly low investment in time and money (other than depreciation costs on canoes and outboards). On the basis of average returns (Figure 2.3), if a hunter desires 80 seals he would obtain 19 in the spring hunt (April-June), 53 in the summer (July-September), and eight during the winter (October-March). He can get these seals in 203 hours or 21 hunting days (Table 2.4). If he does not wish to do any winter hunting, he can get an additional eight seals in summer by devoting an additional two days to sealing in that season.

TABLE 2.4

Time requirements for obtaining eighty seals per year at Sachs Harbour, N.W.T.

Season	Seals[a]	Hunting time[b]	Total time[b]	Hunting days[c]
Spring	19	31:21	31:59	3
Summer	53	126:19	139:34	12
Winter	8	22:48	31:28	6
Total	80	180:28	203:01	21

[a]Based on Figure 2.3

[b]Based on Table 2.2

[c]Hypothetical hunting day assumed to be twelve hours long in spring and summer, six in winter.

The spring requirements, even if the time required estimates are low (see above) are easily met as the weather for sealing is frequently good. Winter requirements, so long as they are kept low, are not difficult to meet in terms of actual hunting time, but the number of potential hunting days can be few. Weeks may go by without the ice opening up, and it is this fact, rather than the arduousness of the hunt, which poses a threat to the trapper if he is short of dogfeed. He is quite likely to get a seal or two for his day's work, but he may be held back from the trail two or three weeks waiting for that day to arrive.

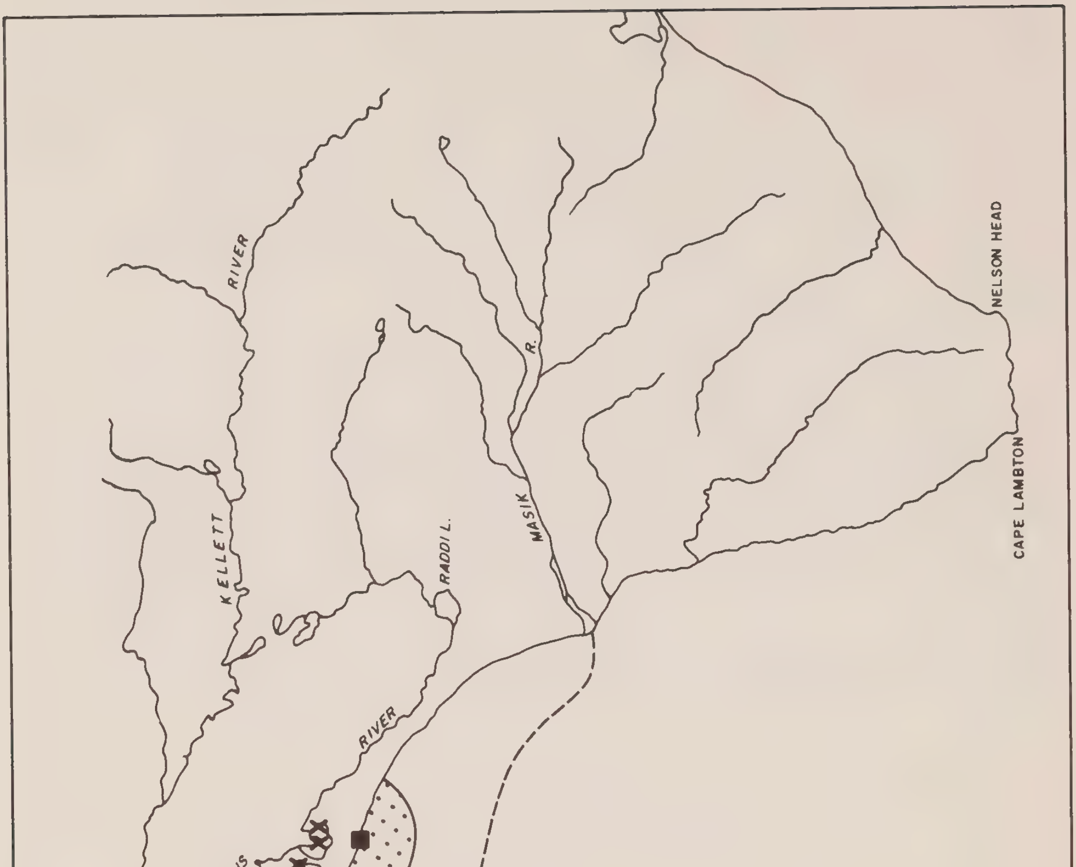

Figure 2.4
SEALING ACTIVITY, BANKS ISLAND
1964-67

Summer time requirements are also not great; theoretically the hunter can obtain the desired number of seals in two weeks or less of concentrated hunting. Again, however, weather and ice conditions intervene. For example, only one half of the days between July 7th and September 7th may be suitable for hunting. On the average, a hunter must be prepared to go out every day for a month in order to get in 14 full hunting days. If loose ice is constantly in the vicinity, most days may be suitable for hunting; in years when there is no ice to mitigate the effects of wind, there may be hardly 14 good days in an entire summer. Only with data for several decades could probabilities be established for the number of days one must set aside in order to get a given number of suitable hunting days, and in which periods the best weather is most likely to occur.

Tentatively it may be suggested that if a man requires 14 hunting days, he should set aside at least four weeks and possibly six to guarantee that he will get out for that number of days. At present with few alternative opportunities or demands on their time, Sachs Harbour hunters can hunt at a leisurely pace during two months or more of open water. However, a man could select a continuous period of time such as July 28th to September 7th in which to hunt, or perhaps two periods from, say, July 7th to 21st and August 10th to September 7th. By building adequate storage pits, he could do most of his sealing in the early summer or even the spring if he wanted to use the late summer period for some other purpose. In this case he might need a few extra seals to make up the essential blubber requirements for winter. Summer need not be fully occupied by seal hunting, and a man can have at least two weeks in mid summer and probably another two or three in September free. During these times, a man could earn some cash if casual labour were available, visit the mainland, or do nothing at all, without prejudicing his ability to meet his dogfeed requirements.

Caribou

The Banks Island caribou is an intergrade species between the barren ground and Peary caribou, more closely resembling the latter. There has been some debate on the taxonomic status of the genus *Rangifer* and its various species (Kelsall, 1968: 23-24). The Banks Island caribou has been formally classified as *R. arcticus pearyi* by Manning (1960:47), and *R. tarandus pearyi* by Banfield (1962:60 ff). The animal is slightly smaller in size and lighter in pelage than the barren ground caribou. The population is resident to the Island although on occasion there is some interchange with herds on Victoria Island and possibly the Queen Elizabeth Islands as well.

Abundance

Several estimates have been offered of the summer population of the herd. Stefansson suggested a figure of 2,000 to 3,000 in 1914 (1921:255), while Manning and Macpherson estimated about 4,000 in 1952-53 (1958:65). In 1951 there appears to have been a great population increase and a subsequent die-off (McEwen, 1955:46 and Macpherson, 1960:27). McEwen believed the die-off to be due to environmental factors while Macpherson suggested that overcrowding was the cause. The latter investigator therefore concluded that the Banks Island population was close to its maximum potential and that hunting would assist in reducing violent

population fluctuations. McEwen on the other hand thought, as of 1955, that mortality was exceeding natural increase and thus hunting should be reduced. Subsequent, less spectacular die-offs were noted in late 1954 and late 1957. These events curiously enough coincide with fox maxima on the Island, although the connections between these events, if any, is not known. Fluctuations in the caribou population seem to have been less severe since the wolf control program was effected, but again the chain of causality, if any, is not clear. A census conducted by Macpherson (1960) in 1959 on the basis of flight transects gave a population of 2,351 caribou on the Island, apparently indicating a reduction over previous years. The herd is currently thought to be in good condition and abundance by the trappers, and there have been no known incidents of reproductive failure in recent years. Hunting continues to be successful with no sign of detrimental effects, and the current population may exceed Macpherson's 1959 estimate.[1]

The migration patterns of caribou on the Island have not been ascertained. The animals appear to be concentrated in the lowlands and are uncommon in the northern and southern extremities of the Island. Caribou are frequently sighted in groups of five or ten, sometimes singly, occasionally in herds of 30 to 50 depending on the season and locale. The great herds and distinct migration patterns of the Barrens are unknown on Banks Island. In the Bankslanders' experience, the caribou tend to be north and east in summer, south and west in winter. The location of kills by month during the 1966-67 (Figure 2.5) shows a clear westward advance during the autumn months. In this case, the location of the kills is not to be explained by hunter preference or custom. The men fan out north and east of the settlement until they start finding caribou, travelling through territory in which caribou appear only in subsequent months.

Utilization of the herd is indicated in Table 2.5. The kill over the last few years has remained stable and has probably amounted to ten per cent or less of the herd. A few Holman hunters go to southeastern Banks Island in some years to hunt caribou, and may take a dozen or so. The substainable yield of the Island herd is unknown but there is no evidence of depletion. Caribou is used exclusively for human food except in an emergency. There appears to be virtually no waste of meat, and skins are used for bedding. The meat yield per animal is given in Appendix D.

Hunting patterns

Figure 2.6 shows the marked seasonal pattern of caribou hunting. After sealing ends in September. there is a brief lull in activity. Those who do not go to the mainland may hunt ptarmigan or owls around the settlement, work on sealskins, haul up their boats and repair winter travelling gear. The tenor of life is relaxed and there is much visiting from house to house.

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[1] An aerial census conducted in June 1970 estimated 4870 caribou north of latitude 73°N, and probably by far the greater part of the Island's population would have been in the surveyed area at that time (Stephen, 1970).

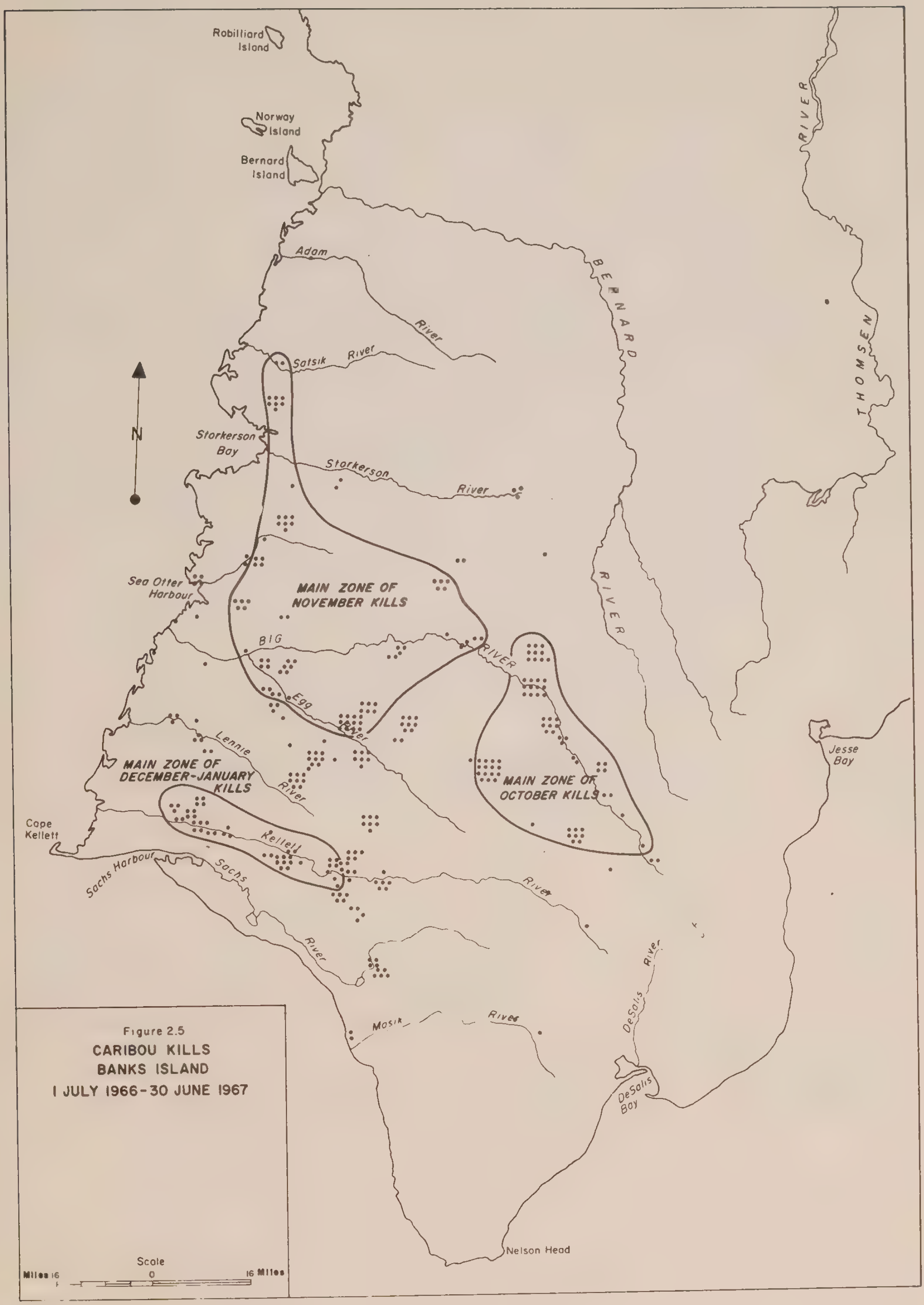


Figure 2.5
CARIBOU KILLS
BANKS ISLAND
1 JULY 1966–30 JUNE 1967

Figure 2.6

PERCENTAGE DISTRIBUTION OF THE ANNUAL CARIBOU HARVEST BY MONTH

BANKS ISLAND, 1964-67

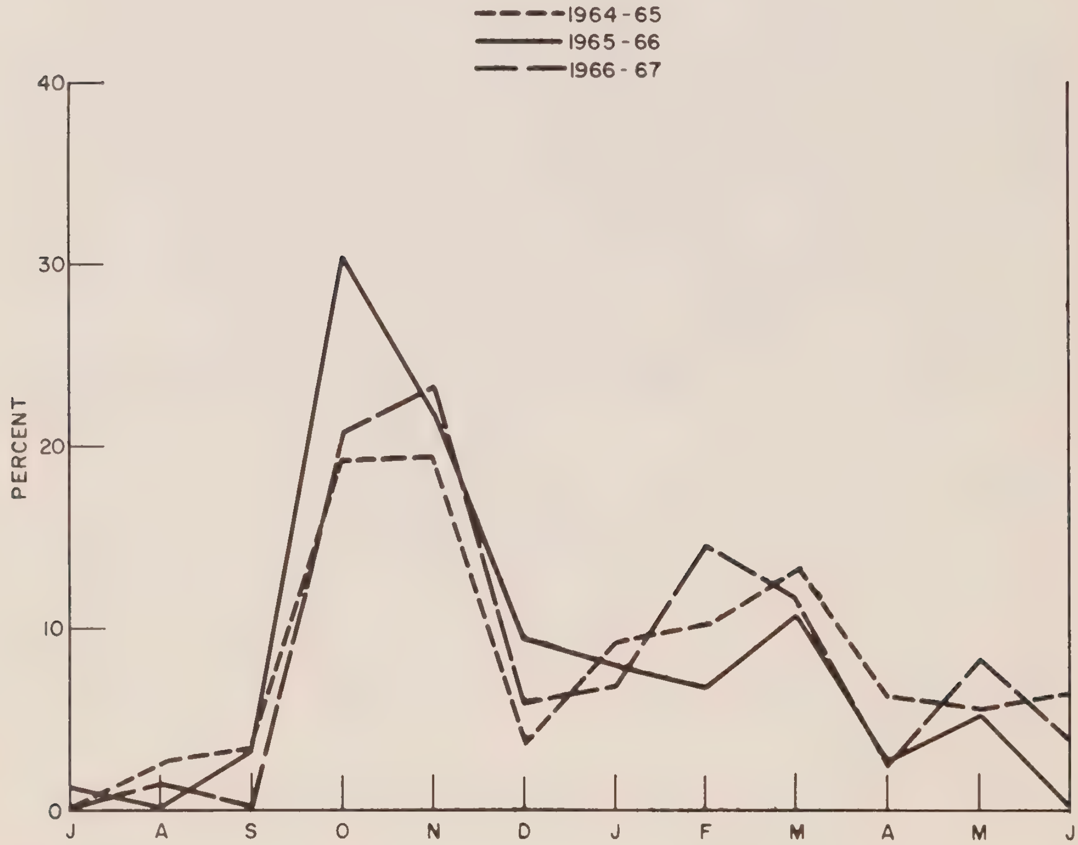


TABLE 2.5

Annual caribou harvest, Banks Island, 1951-67

Year	Number of caribou	Number of hunters[a]	Mean take per hunter
1951-52	187	9	21
1952-53	218	9	24
1953-54	107[b]	10	11
1954-55	271	20	14
1955-56	175	10	18
1956-57	75	5	15
1957-58	300	11	27
1958-59	140	17	9
1959-60	180	17	11
1960-61	249	21	12
1961-62	232	23	10
1962-63	299	20	15
1963-64	225	21	11
1964-65	280	20	14
1965-66	289	21	14
1966-67	306	20	15
Means	221	16	14

[a]Does not always coincide with the number of full time trappers (Volume One, Table A.5), as usually more people are involved in caribou hunting.

[b]Total may be incomplete.

Source: General Hunting Licence Returns, Fort Smith; R.C.M.P. Annual Detachment Reports, Sachs Harbour; field investigations.

Freeze up and accumulation of snow cover is variable. Snow can occur in any month, but not until mid September is it likely to remain on the ground. Overland travel by dog team is ordinarily possible by the end of September, but in some years the ground may be bare well into October. Everyone feels the change in the air and a mood of anticipation comes over the village. In mid September, men begin declaring their lack of interest in seal hunting, and good sealing weather is ignored. By the end of the month, dog driving is the main topic of conversation. With eagerness and excitement the men begin to exercise their dogs and prepare their sleds.

During October the caribou are in prime condition. The meat is considered to be at its peak in flavour and back fat is thick. For this reason the men would ideally prefer to take all their caribou at this time of year, were it logistically possible. Although travelling is often slow and difficult due to the thin snow cover, there is a feeling of competition to reach the hunting grounds first, and many men try to leave around the first of October. Some go caribou hunting for a few days, then go out again to toggle traps. Others may make a longer trip and combine these activities. Those who do not toggle may still go caribou hunting in October, and perhaps jig for fish in the lakes as well.

Men who have not hunted in October do so while setting traps in November. The caribou are more spread out and a man can usually count on seeing a few while travelling on the trap line without making special hunts. Most caribou killed at this time are cached, mainly because the toboggan is already partly full. Some will be brought in later in the year when convenient or necessary, the rest provide a ready source of food on the trail. The viscera supply an immediate need for bait.

Hunting declines during the dark days, although a few men may make short hunting trips from the settlement as the caribou are normally close. As the days lengthen, there is a slight increase in the number of caribou taken, but the kills occur on the trap line and no special trips are made. Some men go inland to hunt in May or June, but only for a few days and generally not so far inland as in the autumn. One old Copper Eskimo woman walks inland with pack dogs to hunt in July and August; otherwise there is no summer hunting on the Island. The summer is thus a period of meat deficit in relation to production, with the greatest shortage occurring in September.

Fall effort inputs

Most fall kills are made in the upper valley of the Big River, or in its tributaries above the Egg River. Sometimes the hunters come upon a small herd, other times upon solitary young bulls. The latter tend to be curious at this time of year, and will approach hunters if the dogs can be kept quiet. Table 2.6 shows the time and distance factors involved in the fall hunt for three separate years, based on trips in which the chief purpose was caribou hunting. Per hunter effort seems to have increased over the period, although this is complicated by toggling and fishing activities which were included in some trips. Indices of time and distance per caribou remained relatively constant. Data from 1966 showed that less than one quarter of the days out were actually spent in hunting caribou, the rest being used for travelling or other activities.

TABLE 2.6

October caribou hunting, Banks Island, 1964-66

	1964	1965	1966
Number of hunters	13	11	7
Number toggling on same trip	1	9	2
Total days out	105	119	93
Total miles travelled	1825	1450	1400
Total caribou killed	70	80	55
Days out per hunter	9	11	13
Miles travelled per hunter	140	132	200
Caribou killed per hunter	5	7	8
Caribou killed per day	.67	.67	.59
Miles travelled per caribou	26	18	25

Source: Field investigations

Some of the caribou meat obtained in October is cached on the trail for winter use, some is hauled home for the rest of the family, and of course some is eaten during the trip. In 1966, about 16 of 55 were cached, and 28 hauled home, leaving 11 which were consumed immediately. Caribou are cached under piles of stones or are slushed over and left to freeze. The hides are particularly suitable for sleeping skins at this time of year and many are taken home to be cleaned and stretched. October is the rutting season and the meat of mature bulls, which has an overpowering odour at this time, is quite inedible except to the dogs. Only four such animals were killed in October 1966.

Caribou hunting requires little capital investment as it simply maximizes use of the dogteam. It does require a high powered rifle (usually of .270 or .30-06 calibre) and a telescopic sight, although such fire-arms are also necessary for bear hunting. There are no accurate data on the number of shells used per animal, but taking all types of conditions into account it is probably three or four. Time requirements are also minimal, as caribou hunting is so frequently compatible with other activities. Generally a man need devote no more than two weeks of the year to the exclusive pursuit of caribou. This time is best spent in October, and possibly late May as well. In neither case does it conflict with other demands.

Requirements

Caribou requirements are somewhat difficult to ascertain as substitute or supplementary foods are not only available but desired. A man living almost entirely on caribou while on the trail will eat three to five pounds per day – perhaps a whole caribou on a three week trip. Foote recorded a similar intake under such conditions among Point Hope Eskimos (1965:274).

At home, the average family requires about one caribou per week (over ten pounds per day) if there is no other food. A family living on caribou alone would certainly require over 50 animals per year. Most hunters however, get less than one third this number. There are other less important sources of country meat, but the Bankslanders have come to regard imported food stuffs such as bread, spreads, soup, macaroni amd tinned fruit as essential components of their diet. Caribou is certainly a staple, and a highly regarded one, but is not the sole source of human nutrients. It supplies about 30 per cent of the Bankslanders' sustenance, and as there is seldom considered to be a shortage of meat, this would appear to be the culturally desired proportion.

Polar Bears

Abundance

The southwest coast of Banks Island, particularly around Nelson Head and Cape Kellett, provides good denning habitat for polar bears. Harington (1968:7) has identified this coast as one of 15 core areas for denning and cubbing in the entire Arctic, and the chief area in the Canadian Western Arctic. Polar bears are very wide ranging beasts, and little is known of the size, structure, territory or movements of the population which breeds in the vicinity of Banks Island. Indications are that their availability to hunters at any particular time and place is largely a function of

ice conditions. Bears thrive in a mixed habitat of ice and water within reasonable reach of land, so that their distribution is chiefly along the margins of the permanent polar pack (Scott, Kenyon *et al,* 1959:367 and Harington, 1964:5). In winter their range tends to extend southwards – in the Western Arctic to Banks Island, Amundsen Gulf and the mainland shore. They may even be found inland many miles from the sea. In summer they retreat north with the ice. In years when Amundsen Gulf and the Beaufort Sea are ice free, there are no bears at all (although they have on occasion been sighted swimming tens of miles from the nearest ice or land). If a heavy concentration of ice persists throughout the summer, bears may remain in or close to the area, and will be more available to hunters not only in the summer but often in the following winter as well. In 1966, when ice persisted around Sachs Harbour for much of the summer, an unusual number of bears were taken in that season. As Harington has stated,

> "It is extremely doubtful that . . . the number of polar bears has oscillated greatly throughout northern Canada, although basic information on the actual population of the region is unknown. It cannot be denied, however, that some bear seasons are "better" than others – on a regional level at least. Some factors contributing to higher survival and reproduction are suitable combinations of ice, open water and land, adequate prey (mainly seals) and forage." (1961:5).

The annual harvest is given in Table 2.7. It does not include bears sometimes taken by Holman hunters off Nelson Head. There is little basis for estimating the regional bear population and its sustainable yield, although if there is a discrete Banks Island population it probably numbers several hundred, judging by Harington's estimates for the Canadian Arctic as a whole (1964:9). There is no clear evidence of a decline in local availability – the very low per hunter takes during the last two years could be due to a variety of factors quite unrelated to population. Due to international concern for the survival of the polar bear as a species, the Territorial government introduced quotas for each settlement on the first of July 1967. The Banks Island quota has been set at 18 bears per annum. In general, all of the hunters partake of this resource or at least attempt to. Bear hunting propensity or skill does not consistently reside with any particular individuals or groups within the community.

The per hunter take fluctuates noticeably, although neither as sharply nor as regularly as the fox take. Unlike the fox take however, this variation is not due to spectacular population fluctuation. Ice conditions have no doubt influenced this curve, but the most important factor is probably an economic one, related to fox trapping, which will be discussed in the following section.

Utilization

Although accurate figures date only from 1951, bears have long been a significant resource to the Bankslanders. During the early years, Captain Pedersen offered good prices for bears and the per hunter take was probably similar to that of recent years. During the late 1930s and 1940s when prices were extremely low, bear takes on the Island appear to have declined. Although early returns are incomplete, they indicate an upturn toward the end of the war when the general demand for all

TABLE 2.7

Annual polar bear harvest, Banks Island, 1951-67

Year	Number of bears	Number of hunters[a]	Mean take per hunter
1951-52	15	9	1.7
1952-53	28	9	3.1
1953-54	20	10	2.0
1954-55	29	20	1.5
1955-56	15	9	1.7
1956-57	21	5	4.2
1957-58	32	10	3.2
1958-59	31	16	1.9
1959-60	34	16	2.1
1960-61	27	18	1.5
1961-62	43	21	2.0
1962-63	20	18	1.1
1963-64	48	19	2.5
1964-65	27	18	1.5
1965-66	10	19	0.5
1966-67	17	19	0.9
Means	26	15	1.77

[a]Does not always coincide with the number of full time trappers (Volume One, Table A.5), as sometimes different people are involved in each activity.

Source: General Hunting Licence Returns, Fort Smith; R.C.M.P. Annual Detachment Reports, Sachs Harbour; field investigations.

furs, particularly in the Western Arctic, increased. Since then, prices have steadily risen, particularly in the last decade, but this has not resulted in a commensurate increase in effort for reasons explained below.

Bears are presently taken chiefly for their pelts, which bring prices of $150 to $300 to producers, although the meat is also utilized. Some of the choice cuts are used for human food, the rest is given to the dogs. The Bankslanders regard the meat as a welcome change, although few would care to make a steady diet of it. Edible yield is given in Appendix D.

There are occasional losses. For example, during a hunt off Nelson Head in May 1965, three freshly killed bears, including the pelts, had to be abandoned when the ice began to break off and move. In the summer of 1966, two bears were shot in open water and could not be retrieved. If bears are killed a long distance from the settlement, it is usually impossible to haul all the meat home and most of it must be abandoned. In no instance would a bear be killed for meat and the skin left unused.

Hunting patterns

Bears are killed whenever and wherever they are seen, and as a result many are taken close to the village, often in association with seal hunting, at least in summers when ice is prevalent. Sometimes special bear hunting trips are made in spring to

Nelson Head or north of Storkerson Bay. Occasionally bears are seen and killed along the traplines. The location of all bear kills made between July 1, 1964 and June 30, 1967, is shown in Figure 2.7. Of a total of 59 bears killed, 45 were taken near Sachs Harbour and eight near Nelson Head. This pattern is understood to be typical, except that the Sachs area is perhaps overrepresented, since there were very few successful spring hunting trips during the years under study.

The seasonality of the bear harvest varies much more than that of any other resource, as a result of the interplay of physical and economic factors (see Figure 2.8). Bears may be taken at almost any time of year (February was the only month in which no kills were made in any of the years examined) but chiefly in either of two seasons, spring or summer. When spring hunts are made, usually two or three men travel together by dog team. On such hunting trips it is not uncommon for hunters to set their dogs loose when a bear is sighted. The dogs nip at the bear from behind, which makes it halt, and present an easier target for the hunter. Well trained and agile dogs are required, and many men have lost good sled dogs which were not quick enough to get out of a bear's range when it turned to attack. In no other form of hunting and trapping activity at Sachs Harbour is the excitement of the chase as keen, the danger to men and dogs as high, or the recounting of the tale such a matter of pride.

Spring bear hunting trips are generally made in early May and last up to a fortnight. In both 1965 and 1966 each hunter travelled an average distance of about 190 miles, obtaining 0.7 bears the first year and none the second. Investment in these trips is very small except in time, but there are few alternative demands at this season. The success of these trips is much less predictable than in any other form of resource harvesting. Bear hunting is not an essential activity, although in some years the money is a significant income supplement. The ante is low and there is always a chance of big winnings, since individuals have been known to return with five or more skins from a hunt.

A few bears are killed each year with set guns, usually in the late winter. These guns (usually old shot guns) are set in a pit in the snow, with bait wired to the trigger, and then covered with a snow block. The bear smells the bait, breaks into the pit, and by moving the bait pulls the trigger so that he will generally be shot in the head. One or two individuals own large leg traps for bear but these have not been used in recent years. Territorial game legislation has at times protected cubs and female bears with cubs. Traps are non-selective and are therefore discouraged.

The relationship between bear hunting effort and fox trapping success

Figure 2.9 shows a roughly inverse variation between individual fox and polar bear takes. In 12 out of 16 years when trapping was below average, bear takes were above average, and vice versa. When trapping has been good there is no great need to make a special effort to hunt bears in the spring, nor indeed is there much time to do so as a good season means much work skinning and preparing pelts, and possibly trips inland to haul foxes and other gear which could not all be brought out during the season. If trapping has been poor, the need is great and time is available, so that if weather and ice conditions permit, the more likely is it that special trips will be made for bear hunting in May. For example, about half of the trappers went bear hunting in May 1965 and 1966, but in 1967 no one made serious efforts to do so although some men had said they planned to.

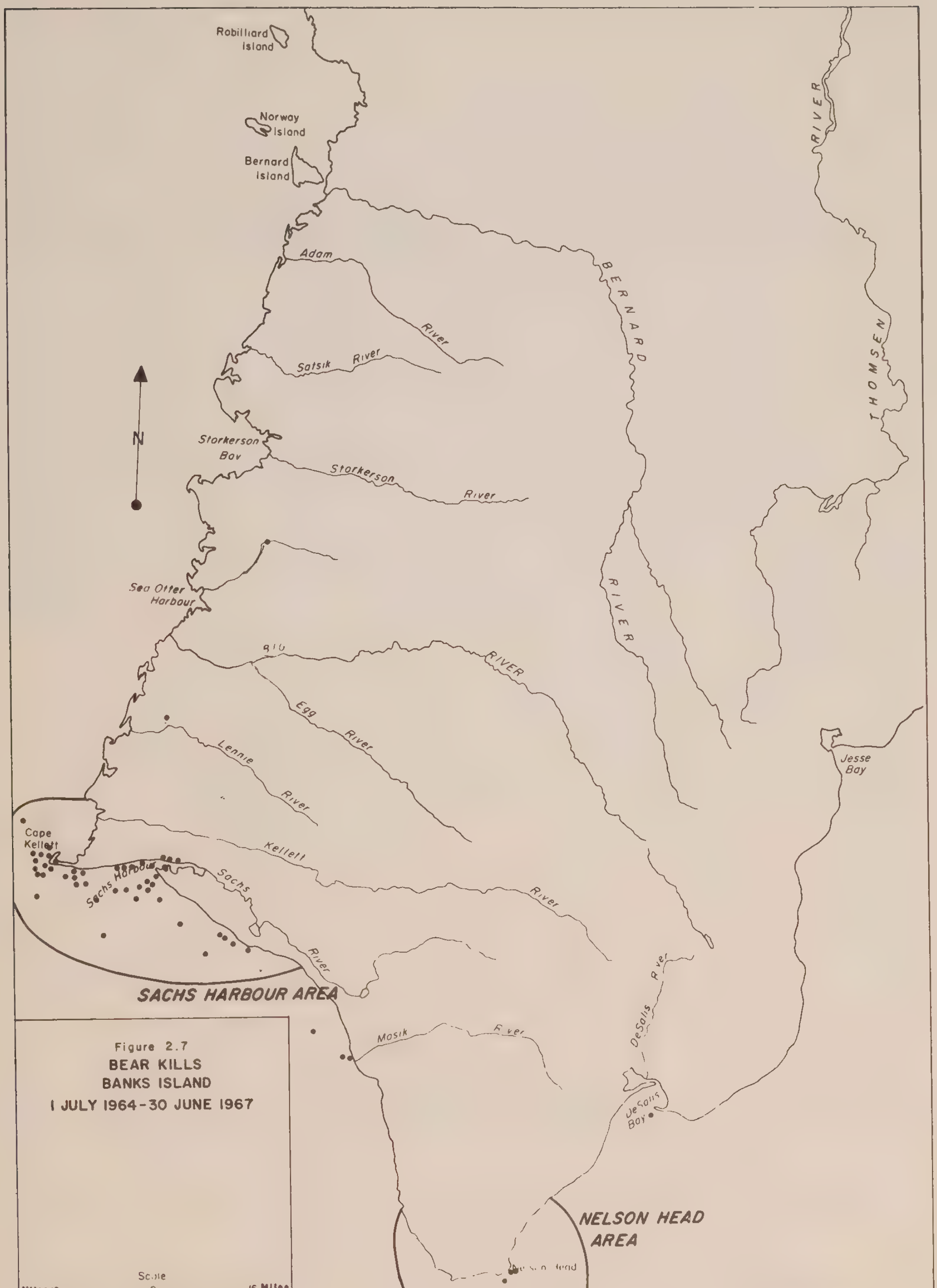


Figure 2.7
BEAR KILLS
BANKS ISLAND
1 JULY 1964-30 JUNE 1967

Figure 2.8

PERCENTAGE DISTRIBUTION OF THE ANNUAL POLAR BEAR HARVEST BY MONTH

BANKS ISLAND, 1964-67

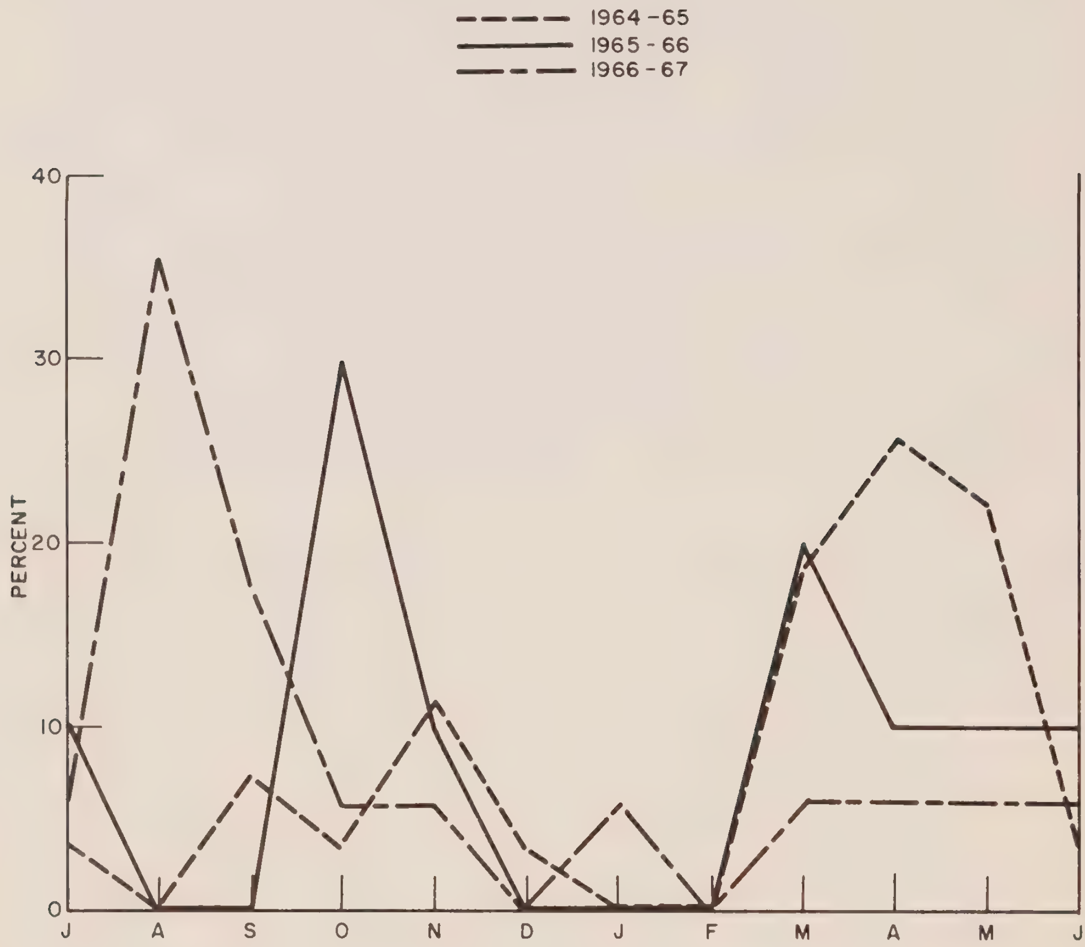
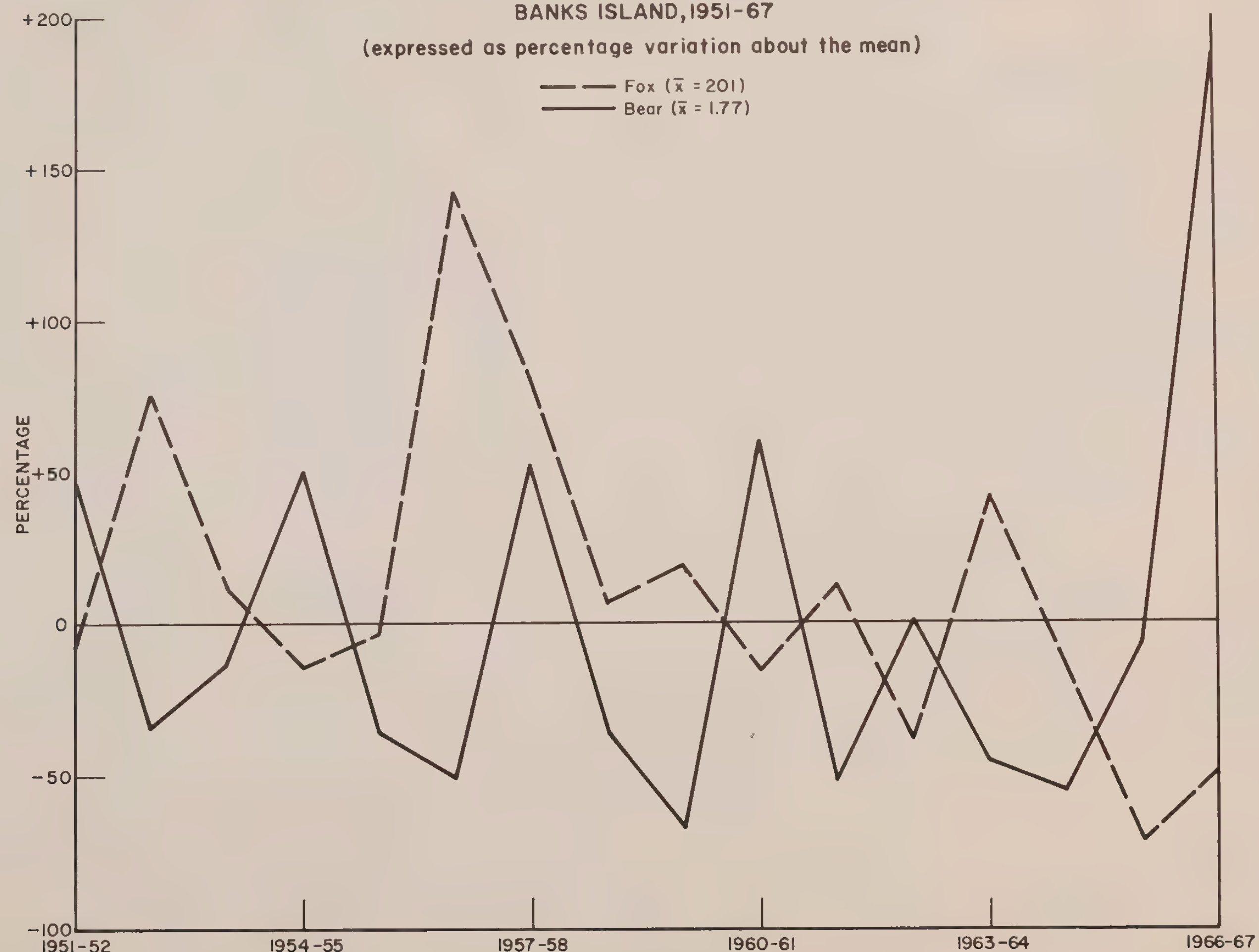


Figure 2.9

COMPARISON OF ARCTIC FOX AND POLAR BEAR TAKES PER TRAPPER

BANKS ISLAND, 1951-67

(expressed as percentage variation about the mean)



The case is a good example of the necessity of understanding the utilization of specific resources in the context of the general resource complex. Potential income from maximum trapping effort is invariably higher, and usually much higher, than from maximum bear hunting effort, so that in the observed tendency of bear and fox takes to vary inversely, bear takes are the dependent variable. No man would actually go bear hunting instead of tending his traps, even though some will say they might do so in March or April. Such remarks probably reflect the strain of the trapping season and a desire for its end, rather than being statements of intent. The men are well aware that the March and April trapping trips are very important in any year, and that only an incredible stroke of good fortune could yield greater returns from bear hunting at this time. Increased bear hunting occurs as a response to poor trapping after, not during the season. This is why the polar bear is to the Bankslanders not so much a substitute for foxes but a supplement to them. Holman Islanders are also known to make special polar bear hunting trips to Prince of Wales Strait when trapping is poor, although generally before the end of the trapping season (Usher, 1965:158). It remains to be seen whether this situation holds in other parts of the Arctic, as it would be of significance to polar bear management. If true, it suggests that hunter pressure on the polar bear population is primarily an inverse function of fox abundance, with the curve distorted to some degree by local environmental conditions. Price per bear pelt, which has been steadily rising over the years, appears not to be an important factor.[1]

Birds

There are many species of birds on the Island, but few are of economic significance. The most important is the lesser snow goose (*Chen hyperborea*). These geese nest in great numbers at the mouth of the Egg River, about 40 miles north of Sachs Harbour. The arriving population varies considerably from year to year. Estimates have ranged from 15,000 to 120,000, but McEwen thought 50,000 to 60,000 the more likely norm (1958:126-27). The birds arrive over a three week period peaking in late May. Some stop to feed on the grassy flats southeast of Sachs Harbour, but almost all of the birds ultimately nest in a 10 or 12 square mile area in the mouth of the Egg River valley, at its confluence with the Big River. Hatching occurs around the end of June, and there is some dispersal to adjacent parts of the Island later in the summer. In late August the geese depart for the south.

At present Sachs Harbour hunters are permitted to take 30 geese per family, but only in the immediate vicinity of the settlement, since the area to the north is now a sanctuary. Egging is forbidden by law. The geese are prized as a welcome change in diet, and the quota is almost always fulfilled. The down is sometimes plucked and used for winter clothing.

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[1] Subsequent developments have altered this pattern. The price of bears has steadily increased, and the hunters now try to obtain their total allotment of 18 bears under the quota system regardless of other circumstances. In order to ensure that the quota is fulfilled, there is an increasing tendency to hunt bears in the fall, if they are available then. The introduction of sport hunting in the spring of 1970 has also increased the interest in the polar bear resource, since each hunting permit brings $2000 into the community. The present quota of 18 bears already yields about $10,000 per year in income, and with an increasing proportion of the quota turned over to sport hunters, this could well double in the next few years. There is every reason to believe that the quota will be reached each year unless there is an unusual scarcity of bears in the district.

All geese are taken in spring, sometimes right at the settlement, in other cases near by in association with spring fishing and sealing. The birds are in excellent condition at this time. In the autumn, they are thinner and by the time they pass over the settlement from the north, they are flying high and out of shotgun range. Other geese such as brants *(Branta nigricans)* are seldom taken as the bag limit applies to all types of geese, and the snow goose being larger and tastier is considered the most desirable.

Various species of eider ducks are found on the Island, but the annual per hunter take is not more than 15. They are not considered good eating, and goosedown is generally used in preference to eiderdown. Some are fed to the dogs or used for trap bait.

Willow ptarmigan (*Lagopus lagopus*) and rock ptarmigan (*L. mutus*) are year round residents of the Island. Manning, Hohn and Macpherson estimated the density of each species at three to five per square mile (1956:6). The average hunter probably obtains 50 or more each year (including some accidentally caught in traps), mainly in spring and fall. Although small, they are well liked roasted or in soup.

Snowy owls *(Nyctea scandiaca)* are occasionally abundant on Banks Island, as like foxes they are dependent on the lemming cycle. Their numbers have been estimated to vary from 2,000 to 20,000 over the cycle (Manning, Hohn, and Macpherson, 1956:106). After good breeding seasons they are ubiquitous, particularly in September and October, after which most fly south. In such years utilization is heavy. In the autumn of 1966 for example, many hunters obtained 30 to 50 owls. They are almost always shot, but in earlier years some individuals set short traplines for them. This involved very little effort as no covering or bait is necessary. The traps need only be placed on small knolls or other likely owl perches, as the birds will invariably alight on the traps and be caught. Owls are occasionally used as human food, but are mainly considered good dogfeed. In years of abundance they tend to be very fat in the autumn and half an owl per dog is considered sufficient, especially if the dogs are not used to them. In the dog pot, two are sufficient to feed a team of nine.

Fish

Fishing has been of minor importance on Banks Island. There is a small arctic char (*Salvelinus alpinus)* run in the Sachs River. The peak of the spring run is thought to occur when the ice goes out from the mouth of the river, some miles up from the settlement. To fish at this time would involve hauling nets and a skiff over the ice, and by the time the water is open in front of the settlement, the run is over. The fall run occurs around the third week of August, and several families set nets in the river about eight miles above the settlement.

In 1966, 14 nets were set in the river, for an average of 13 days, all within the space of 200 yards. Most were about 20 yards long with a mesh size of 3½ or 4

inches. During the run, the equivalent of 193 units of effort[1] yielded an approximate gross weight of 900 pounds of fish (all char), giving 4.7 pounds per unit of effort. Of these about 25 per cent had been partially destroyed by sea lice. Of the remainder about two thirds was eaten at the time and one third put in ice cellars to be used later in the year.

In late May, most families visit the fish lakes and the women and children do a little jigging through the ice. Char and trout (*Salvelinus namaycush*) may be obtained in these lakes. Each family probably gets no more than 30 or 40 fish, which may average only a couple of pounds each, although a few larger ones are taken. Many nearby inland lakes contain char, trout and crooked backs (*Coregonus clupeaformis*) in varying combinations. Raddi Lake and Siksik Lake were frequently fished before 1948, both with jigging hooks and nets. Presently some people fish in Survey and Robert Lakes (part of the Kellett system) in the autumn. Trout of up to 30 pounds have been taken in these lakes, but two or three pounds is the more normal weight. Winter fishing is most uncommon. A few fish of the various saltwater species are occasionally taken in the harbour in front of the settlement.

Arctic hare

The arctic hare (*Lepus arcticus*) is of minor economic significance. The animal is said to be abundant in late winter in the Masik Valley and in the Kellett Valley just below Survey Lake. Very occasionally special trips are made to obtain hares if food is short; in 1965 one man got 60 in the Masik Valley. They are used primarily as food for dogs or humans. The fur is used locally for children's parka trim, and pelts are sometimes sent to relatives on the mainland. That food value exceeds fur value is evidenced by the fact that hares are sometimes fed to the dogs unskinned. Some men may shoot two or three dozen in a year, others very few. Hares are sometimes caught accidentally in traps in the winter. Probably no more than 200 are taken per annum on the Island.

Muskoxen

Of all the creatures of Banks Island only one, the muskox, has experienced drastic over-exploitation during the century since man reoccupied the Island. Muskoxen were apparently common in the 1850s, according to the accounts of M'Clure and Collinson. Stefansson saw none, despite his extensive travels, and concluded that late nineteenth century exploitation by the Copper Eskimos had led to their extinction, although he thought that a few might still exist in the seldom visited southern part of the Island. A permanent close season was declared on muskoxen throughout the Northwest Territories in 1917, and still remains in force. No sightings of muskoxen were recorded in the literature between 1911 and 1949 (see Harington, 1963), although one former resident recalls that a muskoxen was seen by hunters near Lennie Harbour in the early 1940s (personal communication, C. Gruben, Tuktoyaktuk, 24 July, 1967). There have however, been many sightings

[1]One gill net 50 yards by 6 feet set for 12 hours. This measure was used during the area economic survey program conducted by the Industrial Division, Department of Indian Affairs and Northern Development, on the recommendation of the Fisheries Research Board of Canada (Arctic Unit).

in recent years, and there is no doubt that the population has rapidly increased. Macpherson estimated there to be about 100 muskoxen on the Island in 1959 (1960:9), and Harington estimated 150 in 1963 (1963:4). An incomplete aerial census of the Island conducted by the Game Management Service of the Northwest Territories in April 1967 counted over 350 animals.[1] Muskoxen appear to be concentrated in the northern highlands, although there have been several sightings in the Masik and Kellett River areas, and in recent years a muskoxen has wandered into the village of Sachs Harbour every summer. They are least common in the Western Lowlands, and it is probable that muskoxen and caribou utilize separate habitats, at least at certain times of the year (viz. Tener, 1965:48). The possibility of opening a very limited season or quota on muskoxen for Eskimos and/or sport hunting in the Arctic Islands has been discussed by the Territorial Council and the northern press in recent years. The muskox may therefore become a significant resource to the Bankslanders in the future. Sport hunting is the more likely prospect on the Island, since the animals are most abundant at the north end, where it would be uneconomic if not impossible for Eskimos to go hunting for domestic purposes.

Marine Mammals

Two types of whales are common in the waters off southwestern Banks Island: the white or beluga (*Delphinapterus leucas*) and the bowhead (*Balaena mysticetus*). The former is a small whale which travels in schools. Although many of the Bankslanders have both the knowledge and equipment to hunt belugas, none do so. They state that the hunting conditions are not as suitable as in the shallow waters off the Mackenzie Delta, where the mainlanders hunt. In particular, the time and place of beluga occurrence is not at all predictable, so that seal hunting is a much more reliable and rewarding pursuit.

Observations of bowhead whales have been increasingly frequent in recent years. They have been protected from commercial hunting on an international basis since 1912, and today there are no Canadian Eskimos familiar with bowhead whaling techniques. The potential yield of meat and muktuk is tremendous, since the whales weigh 40 or 50 tons. Unsuccessful attempts were made to initiate whaling at Sachs Harbour in the 1950s, and some equipment was obtained. Local break-up patterns are not conducive to successful hunting, spring sealing is not compatible with whaling, and federal and international regulations prohibit trading and trafficking in whale products, and discourage their use for dog feed. Accordingly bowheads are not a resource to the Bankslanders (although interest is expressed in the chase itself) nor is it likely they will become one. A full discussion of the problem of whale hunting is given by Usher (1966:71-73).

Walrus are an infrequent stray in Western Arctic waters. Usually one is taken every two years or so, and of course they provide a large amount of dog feed on such occasions.

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[1] An aerial census conducted in June, 1970, north of latitude 73°N, counted 491 muskoxen and a total of 873 was estimated for the surveyed area (Stephen, 1970).

Other animals

There are other occasional exotic visitors to the Island or its waters, such as grizzly bears, wolverines, narwhals and hooded seals, but these are never taken or used for food or fur. Mention must be made however, of the wolf and the fox as dog feed sources. The former is rarely obtained and its flesh is even more rarely used.[1] The latter is an important source of dogfeed in years of abundance. Where smaller, thinner foxes are used, one per dog is normal, and then a fat supplement may be required. Fat foxes (some carcases may be sheathed in one half inch or more of subcutaneous fat) are very rich and half a carcase is quite adequate for a dog. A man who traps 500 foxes has also obtained nearly one-third of his annual dog feed requirements, although in fact a good percentage of carcases are not used, especially if they are very lean. Edible yield is given in Appendix D.

Country food production

Total annual food production is given in Table 2.8. All data presented in this section are calculated on the basis of a hypothetical "typical" trapper, based on recent production trends previously noted, and edible yields as given in Appendix D. By weight, about three quarters of the food produced is used for the dogs. Figure 2.10 and 2.11 show the sources of dogfeed and human food on a monthly basis, while gross production of dogfeed and human food is compared by month in Figure 2.12. The significance of the two staples, seal and caribou, is evident. The former amounts to 79 per cent of locally produced dogfeed and the latter 73 per cent of human food. However it may also be noted that certain other sources have pronounced seasonal importance. For example, birds and fish are produced in much greater quantity than caribou in the spring, and seal, fish and bear are important in summer. Foxes and bears provide a significant addition to the dogs' diet during the winter, with birds supplementing in autumn and hares in spring. In terms of gross production, the summer months are by far the most important for dogfeed. The bulk of human food is produced in October, November and May, with the remainder of the winter months being slightly more important than the summer months. As most meat is used for dogs, total production still exhibits a pronounced peak in the summer season (Figure 2.12). The data refer to the actual production of food; through the medium of food storage techniques, seasonal diet patterns are evened out and fluctuations damped. The use of imported dogfeed in winter has already been noted. Fox, bear and other meats obtained for the dogs tend to be viewed as a bonus, so that rather than being added to the total meat supply to be used in conjunction with cornmeal, they are fed raw to the dogs in order to obviate cooking and reduce dependence on cornmeal. Thus the true significance of the high proportion of other dogfeed produced in winter should not be overestimated in terms of feeding nights. Five pounds of seal meat will be cooked in the dog pot and suffice for a whole team. Five pounds of bear meat or fox meat on the other hand will be fed raw and serve only two dogs.

In the case of the human diet, cold storage facilities allow the meat component to be much more steady than the production graph would suggest. There

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[1] Although the pelt is prized for the making of womens' parka ruffs.

TABLE 2.8

Typical annual production and use of animal foods by an average Banks Island trapper

Animal	Number obtained	Weight utilized for dog feed (lbs.)	Weight utilized by humans (lbs.)	Total weight of food produced (lbs.)
Seal	80	3638	60	3698
Caribou	15	30	1170	1200
Bear	1.5	361	40	401
Goose	30	0	105	105
Duck	15	20	19	39
Ptarmigan	60	0	54	54
Owl	20	75	4	80
Fish	55	0	107	107
Hare	15	42	40	82
Fox	200	460	0	460
Total		4627	1599	6226

Source: Table B.1.

are, however, periods of relative shortage which tend to occur in the late summer, late winter and to a lesser extent after Christmas. Dependence on particular foods at any given time is not quite as extreme as depicted on the graph, again due to storage. Yet the majority of tables are set with geese in the spring, fish in the late summer, and caribou all through the winter.

The small amount of seal annually assigned to human use consists, roughly in equal proportions, of the tender and flavourful meat of young seals, and of seal oil rendered for consumption chiefly as a dip for dried meat. The caribou meat used for dogs is that of the occasional rutting bull killed.

The annual cycle: Time expenditure and productivity

The details of the annual cycle of life and particularly of economic activity at Sachs Harbour have been described in this and the previous chapter. It seems that no general discussion of Northern peoples, whether it be in the geographic or ethnographic literature, is complete without such a description. There is no doubt that knowledge of the annual cycle furthers our understanding of how a people adapts to its environment through the media of its culture and history, and also of the significance and role of this cycle in the development of institutions, interactions and values within the group.

It is possible, however, to go beyond verbal description, and to introduce some considerations with regard to the annual cycle which have so far received insufficient treatment in the analysis of hunting and trapping economies.

There are first of all other time scales which may be important to consider. Economies based on fur bearing animals are generally cyclic to a greater or lesser degree. There are good and bad years in all such economies, due either to distinctly

Figure 2.10

TYPICAL PRODUCTION OF DOG FEED BY AN AVERAGE BANKS ISLAND TRAPPER, BY SOURCE AND MONTH

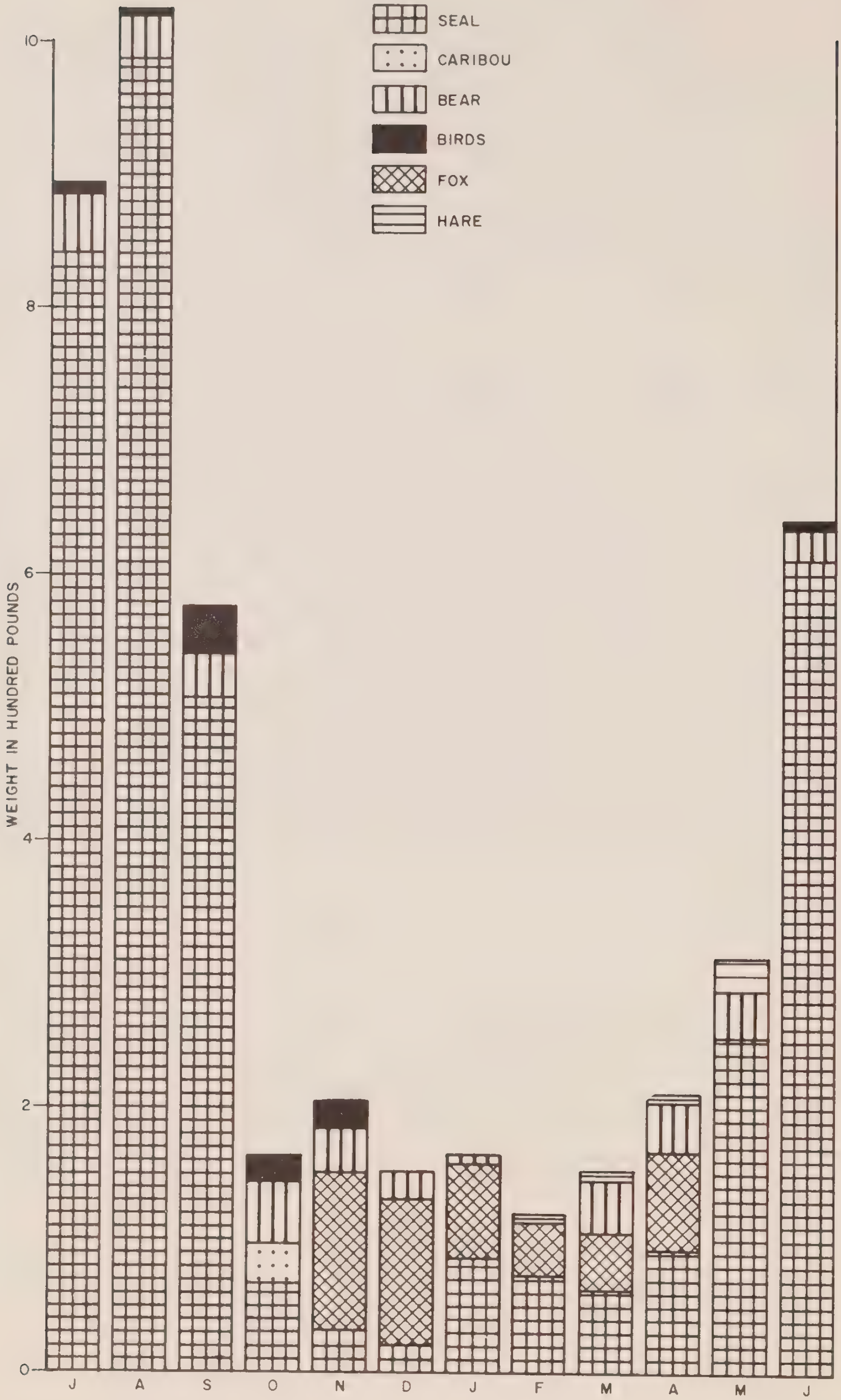


Figure 2.11

TYPICAL PRODUCTION OF HUMAN FOOD BY AN AVERAGE BANKS ISLAND TRAPPER, BY SOURCE AND MONTH

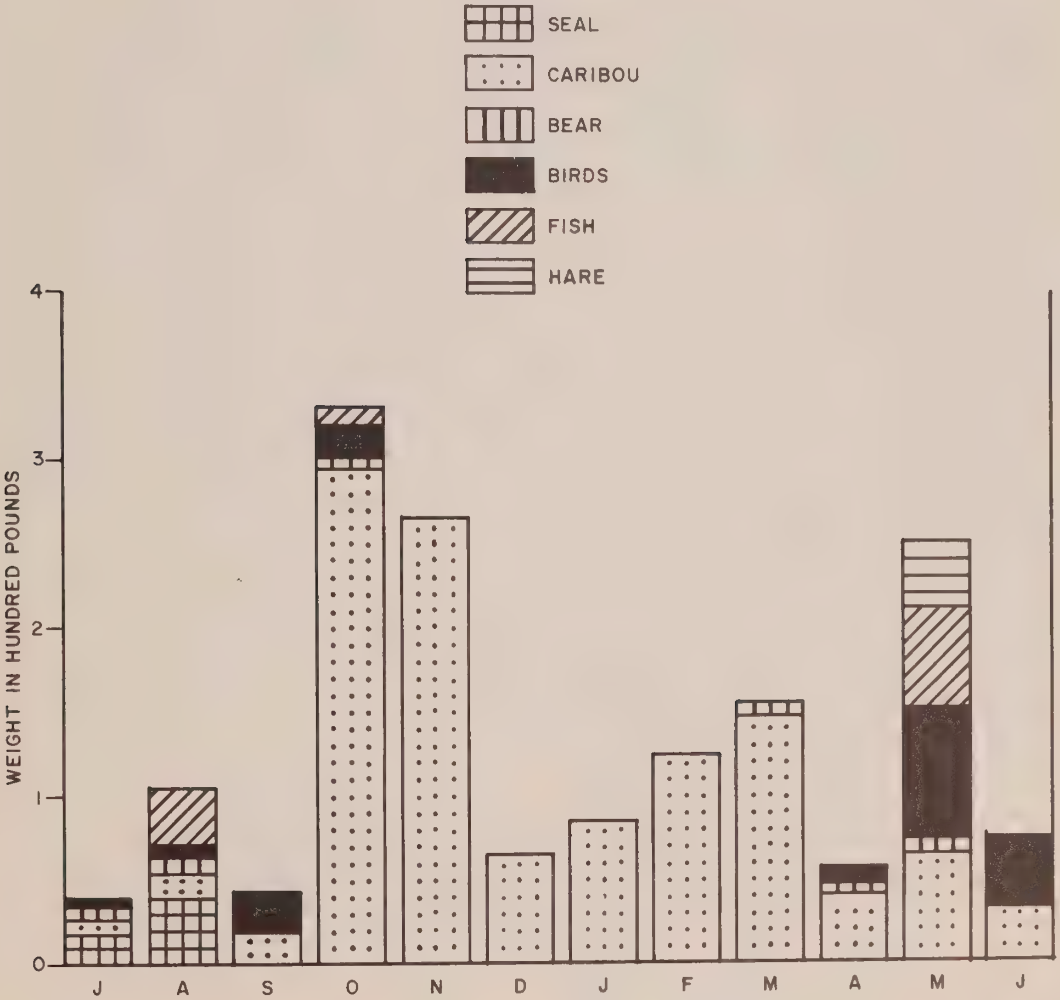
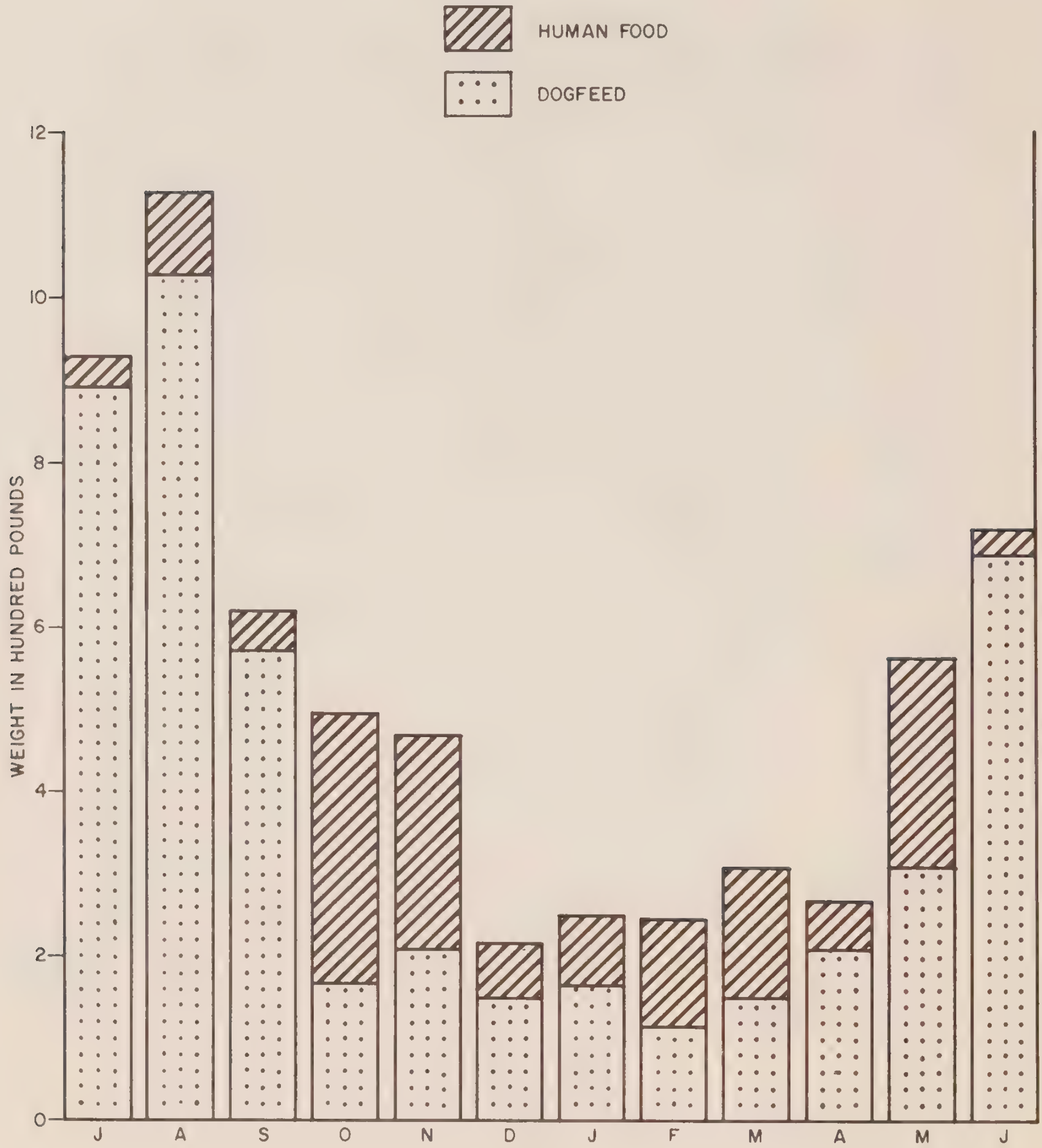


Figure 2.12

TYPICAL PRODUCTION AND USE OF ANIMAL FOODS BY MONTH, BY AN AVERAGE BANKS ISLAND TRAPPER



cyclical occurrences such as the nine or ten year cycle of snowshoe rabbits in the boreal forest, or events of indefinite periodicity such as high or low water levels, severe winters, freezing rain, etc., all of which affect the breeding success and survival of the economically important species. In the Arctic, the fox cycle is well known, and is of profound importance to the Bankslanders in particular. The annual cycle has certain variations which can be predicted depending upon the progression of the fox cycle. Another time scale to be considered is the life cycle of the producer: how many years he works, which are his most productive years, what long term economic goals he sets for himself, if any, and what role his children are expected to play as they come of age. These longer time cycles will be discussed in Chapter Three.

Secondly, while it may be appropriate to describe a "typical" annual cycle or even some variations of it, it must also be realized that events or series of events in a cycle do not occur in a vacuum; they may affect events later in the same cycle or in subsequent cycles. The various events and trends which are described in any annual economic cycle are the tangible manifestations of individual and group decision making with regard to the allocation of time and effort. Every day people make decisions about what they will do and where they will go in response to their perceived needs and opportunities. In any situation where an individual must decide and act upon various options, he advances along a mazeway in which every new move at once opens new options and closes off others. Where outlays of time and capital are involved, the ideal response to new economic situations can seldom if ever be achieved; one cannot be completely flexible since there is a friction of movement to be overcome in reallocating scarce investment resources. Thus a decision to go fishing or to make a visit to Inuvik during the peak sealing season could affect a person's ability to go trapping in February. A successful trapping season might allow a person to spend a long holiday on the mainland the following year, or to make one less trapping trip the next season. The expenditure of considerable effort on toggling in autumn commits an individual to a particular area at an early date, and he may be delayed or prevented from moving his line if necessary. A decision to stay home and clean foxes for auction in January may prevent a trapping trip being made in March. Choosing to enlarge one's house instead of purchasing a new canoe might lower one's efficiency in sealing and trapping for three or four years. Every decision has consequences; these may be manifested dramatically in an opportunity seized or lost eight months or two years subsequently, or collectively they may result in a gradual trend toward the increase or elimination of certain activities. We have tried to show some of the intricacies of the annual cycle in this study.

Thirdly, it is possible to quantify certain aspects of the annual cycle and show graphically the relative importance of the seasons and activities according to various criteria. The percentage of man days spent each month on trapping, hunting, wage employment and visits to other communities is shown in Figure 2.13. The pattern of time expenditure on trapping during the season has already been discussed in Chapter One. It should be noted that although everyone is out on the trapline for most of the first two weeks of April, the time expenditure for the whole month shows a drop from March, since the season ends on the 15th. The level of post season activity in May 1967 was rather atypical, as in most seasons it is possible to haul

Figure 2.13
MONTHLY EXPENDITURE OF TIME, BY PERCENT, SACHS HARBOUR, 1 JULY 1966-30 JUNE 1967

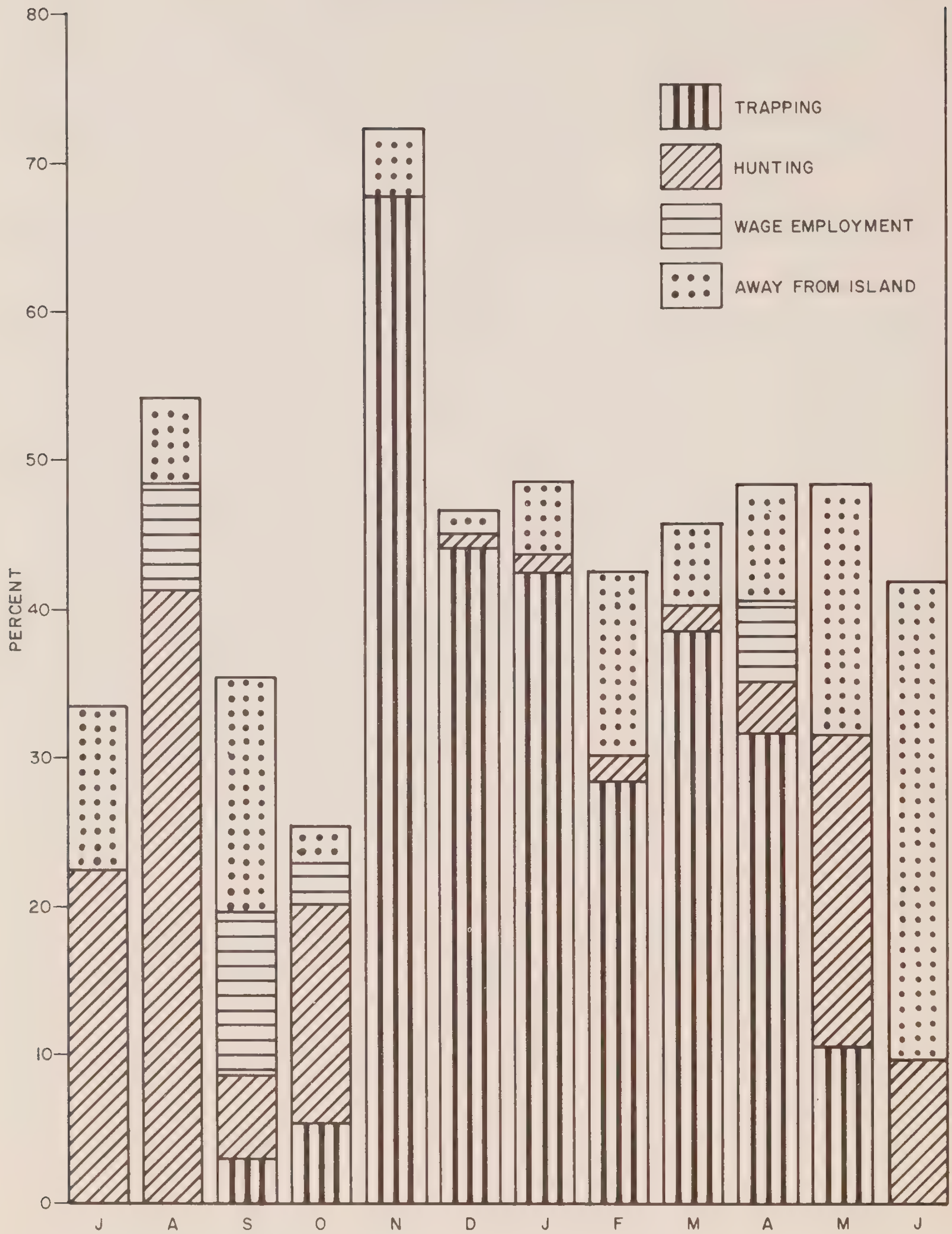


Figure 2.14
ALLOCATION OF MAN-DAYS, BANKS ISLAND
1 JULY 1966 - 30 JUNE 1967

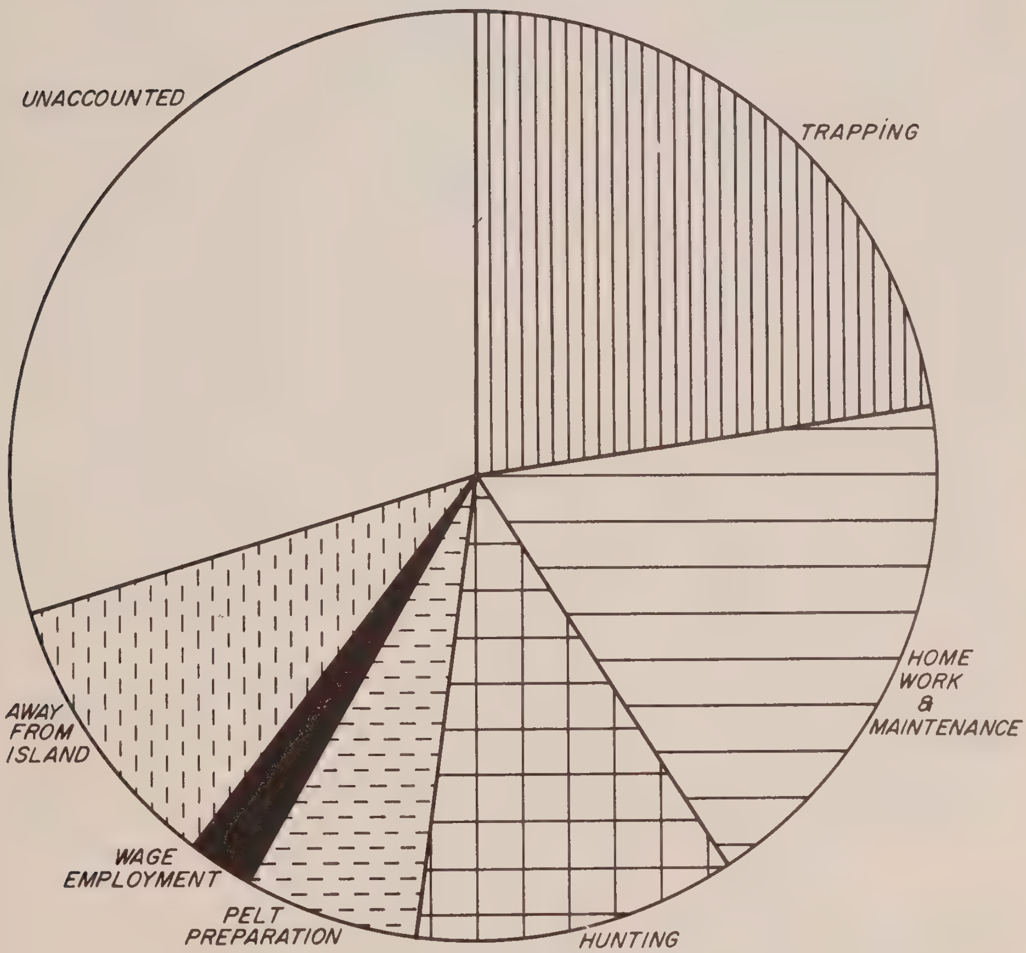
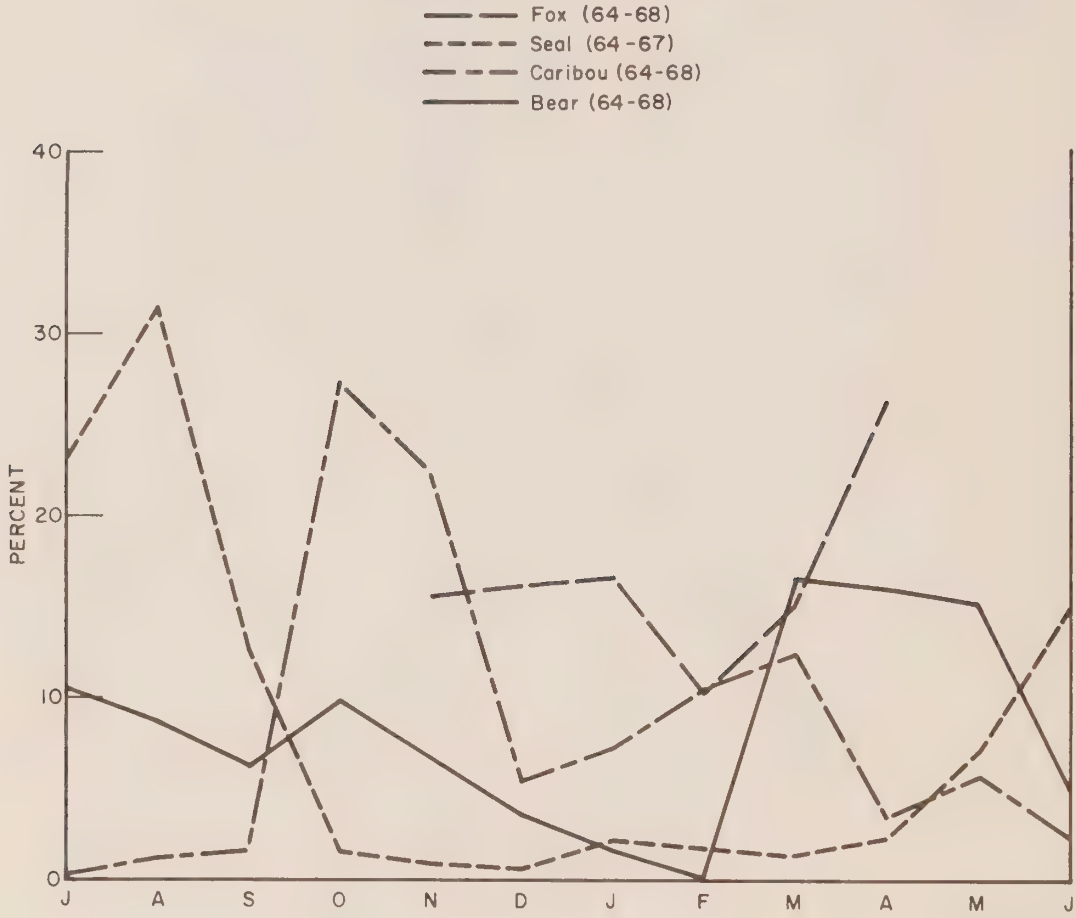


Figure 2.15

MEAN PERCENTAGE DISTRIBUTION OF THE HARVEST BY MONTH FOX, SEAL, CARIBOU AND BEAR BANKS ISLAND, 1964-68



everything in before April 15th. On the other hand, the October time expenditure (toggling) was lower than usual. The minimal importance of hunting in winter is evident. Normally the level of hunting activity for the months of September, October and June is somewhat greater. The timing of wage labour in the cycle is fairly typical, as will be described further in Chapter Three, although the total amount may be slightly above normal. The time spent away from the Island is particularly interesting as it is clearly greatest in the relatively slack months of September, February and June.

Two other forms of endeavour are also important. One is the preparation of pelts and hides. Some of this work is done by women, but in 1966-67 it was estimated that the trappers themselves spent over six per cent of their time on pelt work. Even more time consuming are the host of activities involved in the preparation of gear and the maintenance of the home. Much of this work may only require an hour or two at a time, but when added up it amounts to almost one fifth of the total available man days. On a per household basis, for example, hauling water is estimated to require 24 days per year, and hauling fuel another six. Feeding dogs (not counting feeding nights on the trail) probably amounts to 15 days, and such chores as repairing and making travelling and trapping gear, handywork around the house, moving and storing goods at boat time, etc., accounts for at least another 35. If a man undertakes to build a new house or to make major repairs or additions to his present one, more time will be required. Figure 2.14 shows the division of time between these major activities for the year 1966-67. 33.9 per cent of the time is spent in productive activity (hunting and trapping), and 24.4 per cent on supporting activity (home work, maintenance, pelt preparation). Including wage labour, 60.4 per cent of the number of man days are spent working. This compares closely with the typical industrial or clerical situation in Canada where people are on the job 66 per cent of the year.[1] The trapper's hours are of course quite irregular, but the comparison of total time inputs shows that the amount of leisure time available to the Bankslanders is not unlike that of many working people in the other parts of the country.

There are minor variations in time allocation by specific activity from year to year. Hunting time is usually greater then the level shown in Figure 2.14, while trapping is about the same. Home work and maintenance probably varies only slightly, while pelt preparation is ordinarily less time consuming. The sum total of working activities is probably representative. Time spent away from the Island is generally less than was the case in 1966-67.

Time spent on home maintenance and travel preparation is greatest in autumn, and that on pelt preparation is greatest in spring. The addition of these activities to Figure 2.13 would tend to smooth out total work time from month to month.

The monthly distribution of the total catch of the chief economic species is also indicative of the annual cycle (Figure 2.15). This method of presentation shows a clear dominance of seals in summer, caribou in fall, foxes in winter and bears in spring. It serves to dramatize the seasonal nature of economic activity during the year, but overemphasizes the importance of species whose total harvest is relatively small (e.g. bears). Figure 2.12 on the other hand, which shows food production by weight over the year, emphasizes the importance of the summer months.

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[1] Based on a five day work week, with two weeks vacation and ten statutory holidays.

CHAPTER THREE

INVESTMENT, INCOME AND EXPENDITURE

In any modern hunting and trapping system, investment in capital equipment is high. Sachs Harbour men know that the return on their effort is maximized by using the best equipment and maintaining it well. This chapter will begin by illustrating the nature and magnitude of this investment, from which the production costs of fur and game can be derived. The next section will discuss the sources and magnitude of income. Particular attention will be given to the preparation and marketing of pelts, and to comparing income from cash and kind with production costs. Finally, the general expenditure pattern will be examined.

Capital goods and operating costs

There are two foci of investment in capital goods: items used directly in trapping and hunting, and those used for travelling and camping. The former consists of traps and firearms. A well equipped trapper owns 600 traps or more, and four firearms, including two high powered rifles with telescopic sights. Two important items of travelling and camping equipment are for summer use. These are the freight canoe and the outboard motor. Dogs do not ordinarily represent a capital cost, as a full quota is maintained by breeding, although people occasionally buy dogs from mainland people or from each other. During rabies epidemics on the Island, mainland dogs are in considerable demand. The cost of purchasing a good team of nine dogs on the open market would probably be $500. Toboggans are used in winter when the snow cover is good, but in the autumn and spring mud sleds are preferred. Other major items are harnesses, dog lines and chains, and a tent. In addition there are numerous small items, such as axes, snow knives, sled anchors, dogpots, ladles, gas cans, rope, primus stoves, kitchenware, lamps, and sleeping bags. Many of the above items are handmade, but the materials must still be imported. The chief sectors of operating costs are ammunition, corn meal for dogfeed, gasoline, outboard oil, and naphtha gas for pressure lamps and stoves.

These goods are itemized in Table 3.1which shows their replacement costs and depreciation rates. The depreciation rate is taken as the equivalent of the mean age of all items of a given type, based on the assumption that the trappers' capital stock as a whole is not aging or depreciating. Where data could not be obtained or are biased due to a recent trend towards certain items, an estimated value is used. The table is based on a census of capital goods taken in May 1967, and represents a refined and updated version of that presented previously by Usher (1966:90).[1] This basic "outfit" costs $3,090, (not including dogs), and depreciates at a rate of 21 per cent per annum. Annual maintenance and operating costs are virtually equal and together amount to almost $1,290. Some trappers spend more than this. They may have more traps, more rifles, and a spare outboard, and they may purchase dogs from time to time. Costs and investment have increased in the last several years and will continue to do so. There is already a trend toward larger canoes and outboards,

[1] Similarity in mean life of equipment between the two censuses confirms the validity of using these figures to calculate depreciation.

TABLE 3.1

Investment in capital goods, depreciation and operating costs per hunter, Banks Island

Capital Goods

Item	Replacement value	Expected life in years	Annual depreciation
Hunting and trapping equipment			
600 traps, size 11/2	$ 750.00	10.0	$ 75.00
.22 rifle (birds, small game)	70.00	3.5	20.00
.222 rifle (seals)	175.00	3.0	58.33
.243 or .30/06 rifle (big game)	175.00	6.0	29.17
12g. shotgun (birds)	135.00	8.5	15.88
2 telescopic sights (4 power)	130.00	10.0[a]	13.00
Subtotal	$1,435.00		$211.38
Travelling and camping equipment			
20' canoe	$ 600.00	6.0	$100.00
15 HP outboard[b]	500.00	3.5	142.86
toboggan (10' bottom)	50.00	2.5	20.00
mud sled (12')	50.00	3.5	14.29
harnesses	125.00	2.0	62.50
dogline and chains	50.00	10.0[a]	5.00
tent	80.00	2.0	40.00
other gear (see text)	200.00	4.0[a]	50.00
Subtotal	$1,655.00		$434.65
Total	$3,090.00		$646.03

Operating Costs

Item	Annual Expenditure
Ammunition (rounds: .22 – 500, .222 – 350, heavy guage – 150, shotgun – 125)	$135.00
Cornmeal (1100 lbs.)	220.00
Gasolene (150 gals.)	187.50
Outboard oil (25 qts.)	37.50
Naptha gas (50 gals.)	62.50
Total	$642.50
Total annual depreciation and operating costs	$1288.53

[a]Estimated value, where data biased or unavailable.

[b]In fact, there are very few 15 HP outboards in use. Most are in the 9.5-10 HP or 18-20 HP classes, and there is a gradual transition toward the latter. Mean rating of all engines in the settlement, however, is approximately 15 HP.

Source: field investigations.

and more important, winter transport will gradually become mechanized. Initial attempts to introduce snowmobiles on Banks Island, and the problems encountered have previously been described by Usher (1966:89-94).

The importance of an adequate stock of capital equipment cannot be overemphasized. Each of the items listed in Table 3.1 is an essential tool of production. There is no more important investment a trapper can make. Trappers who have for what ever reason been unable to equip themselves adequately are bitterly aware of the cost (viz. Usher, 1966:87-88).

Production costs

Detailed calculations of production costs, and the basis and method of deriving them, are given in Appendix E. Briefly, they are based on direct input costs (consisting of both operating and depreciation costs) plus the reallocation of dogteam maintenance costs[1] to each commodity. No attempt is made to evaluate human labour and include this in production costs. The most important data are given in Table 3.2.

Although there have been numerous studies of the hunting and trapping economies of the north, the costs of production of country food and pelts have rarely been adequately ascertained. Some have assigned values to country produce according to other criteria, as discussed below. Foote (1967b: 116ff) and Haller (in Anders, 1967: 83-84) have derived the operating costs per seal for east Baffin Island, but had to estimate depreciation costs. The true cost of maintaining a dogteam was not included in their calculations. Their data were not presented in a form comparable to that given here, however it may be inferred that costs per landed seal or per traded skin on east Baffin are not greatly different from those at Sachs Harbour. For example, operating costs per landed seal during the open water season in east Baffin varied from $3.42 to $5.65. If as at Sachs Harbour, depreciation costs are about equal to operating costs, the total figures would be about $7.00 to $11.00, which compare to $9.15 at Sachs Harbour.

Where there is great variation in output, despite relatively constant inputs, as in fox trapping, the cost per item given in Table 3.2 is a mean value only. Variation in cost per fox pelt with total output is shown in Figure 3.1.

The essential features of the method outlined here have long been well known to economists and accountants. Yet this method has not hitherto been applied fully to the analysis of hunting and trapping economies, despite the fact that approximate data at least are not unduly difficult to obtain. It has wide applicability over time and place, particularly as the basic input-output matrix (Table E.3) allows the effect of changing costs or ecological dependence to be computed in simple and uniform fashion. Finally, it seems likely that the production costs given in Table 3.2 are indicative of those over much of the north. Variation in local ecology, hunting methods and allocation of time and investment will certainly alter the values, but the general order of magnitude will probably not differ greatly.

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[1]The average dogteam travels 1,620 miles per year, at a cost of $974.72, giving a per mile cost of $0.60.

TABLE 3.2

a.

Production costs of country foods and pelts, Banks Island

Commodity	Cost per animal	Cost per lb. edible food	Cost per[a] pelt
Fox	$ 4.34	$ .91[b]	$ 4.34
Seal	7.78	.17	9.15[c]
Caribou	9.70	.12	–
Bear	50.67	.19	50.67
Goose	.93	.27	–
Duck	.13	.05	–
Ptarmigan	.04	.05	–
Owl	1.00	.25	–
Fish	1.09	.58	–
Hare	.53	.10	.53

[a]This is a duplication of cost per lb. of edible food, not a separate cost. Either may be used depending on the primary use made of the animal.

[b]Based on direct input costs of $2.10 per fox.

[c]Based on number of saleable pelts (60) which is less than the total taken. It is assumed for other species that all pelts retrieved are saleable.

b.

	Total cost	Mean cost per lb.
Dogfeed[a]	$708.09	$ .17
Human food	256.09	.16

[a]Excludes foxes.

Source: Appendix E.

Sources of income

Two features of personal income at Sachs Harbour are remarkable. The first is that virtually all of it is derived from the sale of furs, the second is that it varies in the extreme from one year to another. Let us first examine the sources of income.

Cash income data for the four years 1963-67 are given in Table 3.3.[1] During this period, fully 95 per cent of the full time trappers' income was derived from the proceeds of trapping and hunting, while for the community as a whole the figure was 87 per cent.

The chief alternative source of income is wage labour. There are two full time positions open to native people at Sachs Harbour: special constable with the

[1]None of the income data in this section include the profit accruing to the owner of the village trading post.

Figure 3.1
VARIATION OF COST PER PELT WITH NUMBER OF FOXES TRAPPED

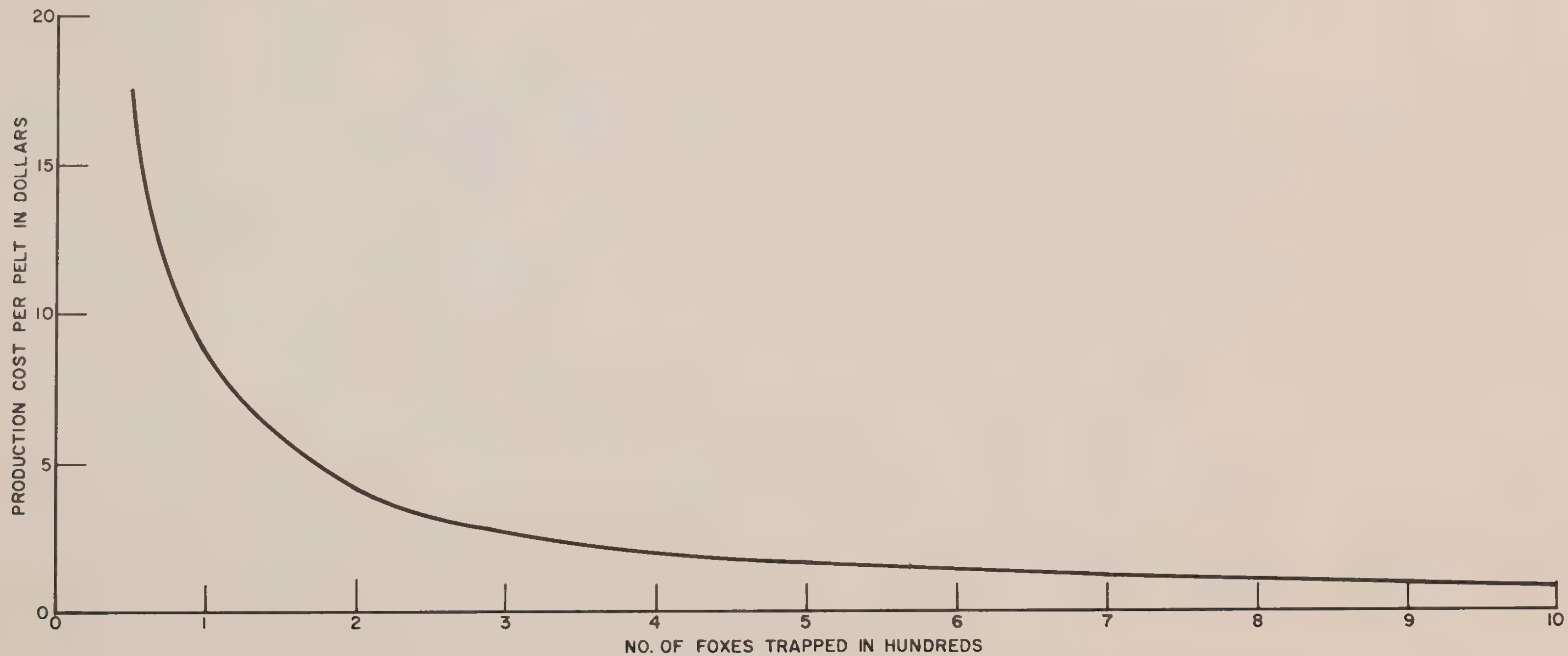

TABLE 3.3

Sources of community income, Sachs Harbour, 1963-67

Source	1963-64		1964-65		1965-66		1966-67		4 year means	
a. Entire community										
	N=101(20)		N=92(19)		N=100(19)		N=101(21)		N=100(20)	
Fur	$84,000*	(88.8%)	$61,210	(84.0%)	$ 83,503	(78.5%)	$217,233	(91.6%)	$111,737	(87.3%)
Wages	4,465	(4.7%)	4,802	(6.5%)	12,000*	(11.3%)	14,000*	(5.9%)	8,817	(6.9%)
Handicrafts	1,100*	(1.2%)	784	(1.1%)	1,200*	(1.1%)	600*	(0.2%)	921	(0.7%)
Statutory payments	2,512	(2.6%)	2,919	(3.9%)	2,758	(2.6%)	2,556	(1.1%)	2,686	(2.1%)
Relief	2,565	(2.7%)	3,361	(4.5%)	6,845	(6.5%)	2,858	(1.2%)	3,907	(3.1%)
Total	$94,642	(100.0%)	$74,076	(100.0%)	$106,306	(100.0%)	$237,247	(100.0%)	$128,068	(100.0%)
Income per family	$ 4,732		$ 3,899		$ 5,595		$ 11,297		$ 6,484	
Income per capita	$ 937		$ 772		$ 1,063		$ 2,349		$ 1,287	
b. Full-time trappers only										
	N=92(19)		N=86(17)		N=75(16)		N=69(15)		N=81(17)	
Fur	$82,648	(95.0%)	$61,633	(91.8%)	$ 79,487	(91.8%)	$198,064	(97.4%)	$105,458	(95.0%)
Wages	865	(1.0%)	1,863	(2.8%)	1,000*	(1.2%)	2,000*	(1.0%)	1,432	(1.3%)
Handicrafts	1,000*	(1.2%)	684	(1.1%)	1,000*	(1.3%)	525*	(0.3%)	827	(0.8%)
Statutory payments	2,464	(2.8%)	2,565	(3.8%)	2,298	(2.6%)	2,142	(1.0%)	2,367	(2.1%)
Relief	0	(0.0%)	360	(0.5%)	2,697	(3.1%)	564	(0.3%)	905	(0.8%)
Total	$86,977	(100.0%)	$67,105	(100.0%)	$ 86,582	(100.0%)	$203,295	(100.0%)	$110,939	(100.0%)
Income per trapper	$ 4,578		$ 3,947		$ 5,411		$ 13,553		$ 6,626	
Income per capita	$ 945		$ 780		$ 1,154		$ 2,946		$ 1,379	

*estimated

N=number of people (number of families or trappers)

Source: Traders Fur Record Books and Fur Export Tax Returns, Sachs Harbour, Inuvik and Fort Smith, N.W.T.; Dept. of Indian Affairs records, Inuvik, N.W.T.; field investigations.

R.C.M.P., and (since 1965) maintenance work with the Department of Transport. There is also a limited amount of casual labour, available usually as bull cook or heavy equipment operator for the D.O.T. in summer, occasionally as guide to visiting investigators. Casual labour provides 1.3 per cent of full time trappers' income and is usually earned by only two or three people. The opening of permanent wage positions at the settlement has tended to recruit local trappers, although data for 1963-67 indicate that these wage positions do not provide a larger gross income in the long run (i.e. there is no opportunity cost for trapping).[1]

Handicrafts account for less than one per cent of community income and is earned entirely by women. Several women are highly skilled, but demands on their time for household chores, child rearing, mending and making clothing and preparing pelts is so great that they have little time to earn money in this fashion.

Transfer payments (unearned income) are very low at Sachs Harbour. They comprise 5.3 per cent of community income and a mere 3.0 per cent of full time trappers' income. This was slightly lower than for Canada as a whole, where 6.2 per cent of personal income was derived from transfer payments during those years.[2] Statutory payments consist almost entirely of family allowance benefits. Direct relief has always been minimal at Sachs Harbour. Most payments are made to widowed heads of families. Payments to able bodied trappers have provided less than one per cent of their income over the last four years, again closely comparable to the national average (direct relief accounted for 0.4 per cent of personal income in Canada during the same four years). Only in 1965 has relief ever risen above one per cent of income, for reasons described below, and in some years trappers required no relief at all. This is in startling contrast to other northern settlements (Table 3.4). In most other Arctic communities direct relief is high, and other sources of cash sufficiently low that statutory payments are an important component of total income.

Income from furs

The number and value of the chief pelts and skins produced are given in Table 3.5. From 1963 to 1967, about 78 per cent of fur income was derived from fox pelts, 19 per cent from seal skins, and three per cent from bear skins. The high proportion of income from seal skins is atypical, and is due to the unprecedented seal price boom of 1963-65. This boom came at a fortunate time for the Bankslanders, towards the end of a series of lean fox years. Indeed in 1964-65 more income was realized from seals than from foxes, for the first and only time in the history of the Island. The normal longterm pattern is at least 85 to 90 per cent of fur income accounted for by foxes, with seals and bears making up the total in approximately

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[1] Two additional full time wage positions have been made available to local people as a result of the establishment of a day school and an administrative office since 1967. These institutions also provide opportunities for casual labour, so that both full time and casual labour income has risen as a proportion of total community income in the last three years.

[2] Calculated on the basis of transfer payments of a welfare type made directly to individuals by all levels of Government. These include Family Allowance, Old Age and Disability Pensions, Veterans Pensions and Allowances, Unemployment Insurance Benefits, Workmen's Compensation and Direct Relief. Source: Canada, D.B.S., *National Accounts, Income and Expenditure, 1967.*

equal proportions. In earlier years, seal skins could not be sold at all, but a steady, modest market should continue to exist for the foreseeable future. Bear skins have so far been a minor source of income. Despite the imposition of a quota in 1967, rising prices and the possibilities for sport hunting will probably increase the contribution of polar bears to fur income, both absolutely and proportionately, especially in poor fox years.

TABLE 3.4

Fur income and transfer payments as proportions of total cash income for selected communities or regions of the Canadian north

Community or region	Fur income as per cent of total	Transfer payments as per cent of total	Time period	Source
Sachs Harbour	87	5	1963-67	Table 7.3
Coral Harbour	69	10	1958-61	Brack, 1962:51
Lake Harbour	29	18	1966-67	Higgins, 1968:136
East Baffin	24	26	1965-66	Anders, 1967:181
Coppermine-Holman	21	36	1962-63	Usher, 1965:204, 228
Aklavik	14	25	1965	Bissett, 1967:135
Keewatin Mainland	13	36	1961-62	Brack & McIntosh, 1963
Cape Dorset	12	13	1966-67	Higgins, 1968: 115
Tuktoyaktuk	8	17	1961-62	Abrahamson, 1963:53

Figure 3.2 indicates the extreme cyclic pattern of fox fur income. Since this source is so dominant, the relative stability of the other sources of cash can only dampen the effect of these fluctuations very slightly. Income is quite likely to vary by a factor of four over a cycle. The implications of this for expenditure and finance will be discussed below.

Finally, the total proceeds of trapping are by no means equally shared. The highest individual income each year is well above the mean and Table 3.6 shows the range in incomes for the last three years.

The preparation of pelts and skins

Between bringing an animal home and sending its pelt to market, there are certain necessary processes involved which incur costs to the producer and may also reduce slightly the total number of items he has for sale. Let us examine these steps in detail for the white fox. Plates 3.1 to 3.8 illustrate much of the process.

If the animal was not skinned on the trail the frozen carcase must be brought into the house and thawed (some are left until spring and thawed in the open air). The animal is then skinned. Slits are made along the hind legs to the anus, and the bone is pulled out of the tail. The pelt can then be pulled off the carcase towards the head, like a glove. An experienced man can do this in five minutes or less on the average without exertion. If the subcutaneous fat is heavy, the pelt must be fleshed.

TABLE 3.5

Income from pelts and skins, by type, Banks Island, 1963-67

	Fox			Bear			Seal			
Years	Pelts	Value	Per cent of total income	Pelts	Value	Per cent of total income	Pelts	Value	Per cent of total income	Total
1963-64	1,982	$ 47,578	57.6	39	$ 5,850	7.1	974	$29,220	35.3	$ 82,648
1964-65	1,498	21,728	35.3	27	3,700	6.0	2,043	36,205	58.7	61,633
1965-66	2,932	70,046	88.0	8	1,200	1.5	919	8,421	10.5	79,487
1966-67	8,447	189,567	95.7	15	2,275	1.1	672	6,222	3.1	198,064
Total	14,859	$328,919	77.9	89	$13,025	3.1	4,608	$80,068	18.9	$421,832

Source: Traders Fur Record Book, Fur Export Tax Returns, Sachs Harbour, Inuvik and Fort Smith, N.W.T.; field investigations.

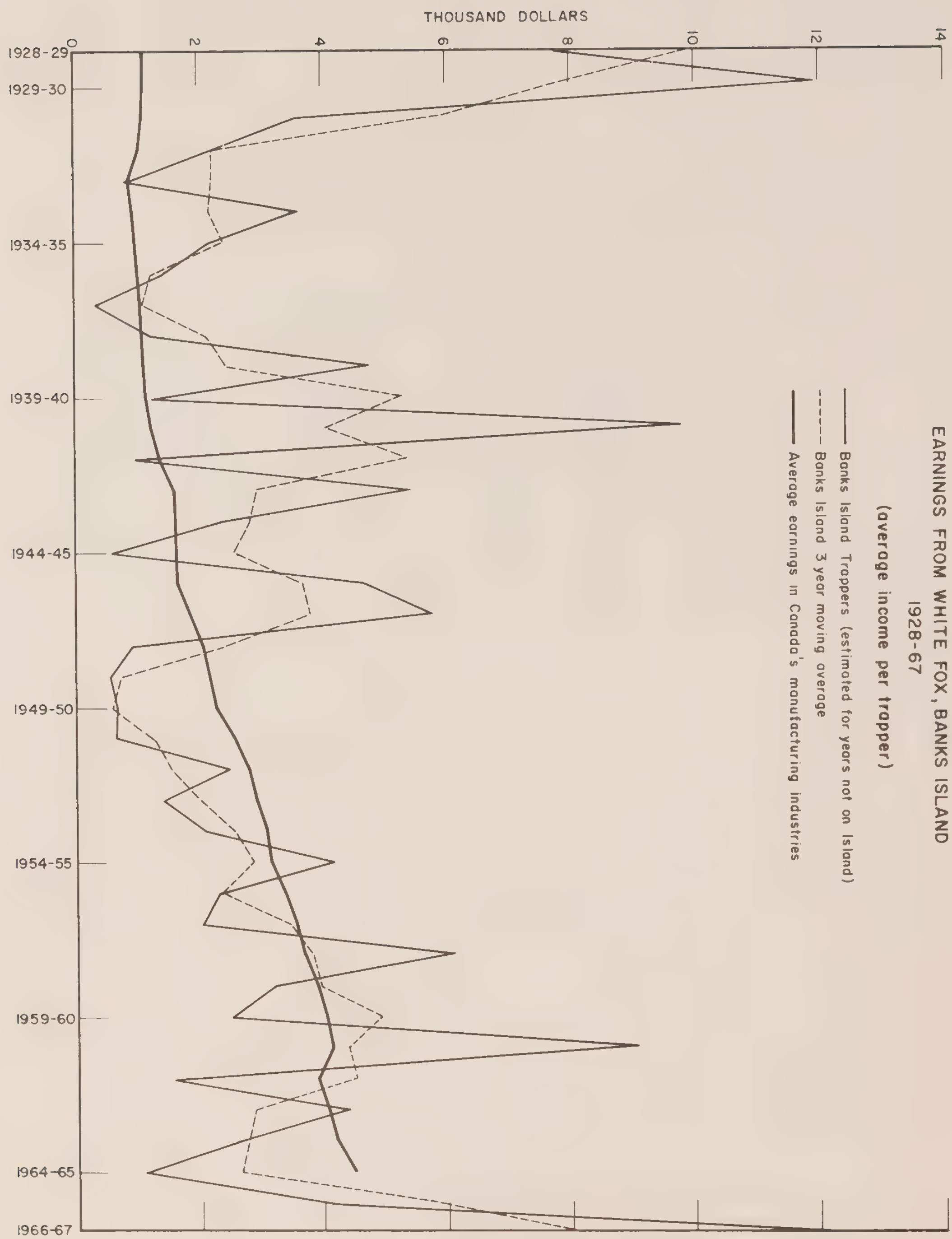


Figure 3 2
EARNINGS FROM WHITE FOX, BANKS ISLAND
1928-67
(average income per trapper)

Plate 3–1

Thawing foxes indoors, December 1966.

Plate 3–2

Skinning a fox, December 1966.

Plate 3–3

Skinning a fox, December 1966.

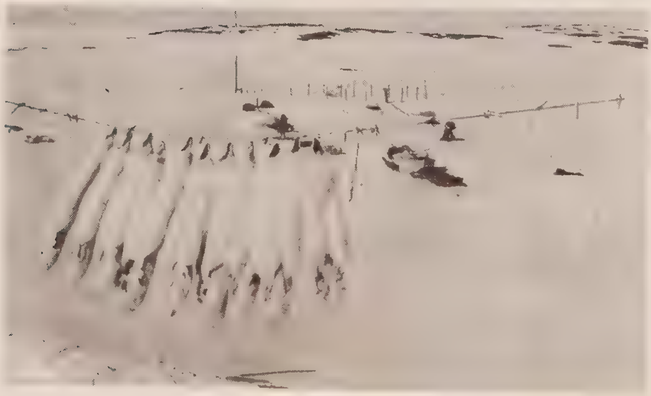
Plate 3–4

Stretching fox pelts, May 1965. The pelts are pulled over stretchers and left to dry.

Plate 3–5

Flouring foxes, May 1965. A mixture of cornmeal and flour is rubbed in and then brushed out.

Plate 3–6



Airing fox pelts on a clothesline, May 1965.

Plate 3–7

Baling fox pelts, December 1966. Pelts are usually shipped to auction in bales of 50.

Plate 3–8

Shipping furs by air, January 1967. About $20,000 worth of fur is contained in the bales in the centre of the photo. These will reach southern auction houses within the week.

TABLE 3.6

Distribution of fur income, Sachs Harbour, 1964-67

Income bracket ($)	Number of Earners 1964-65	1965-66	1966-67
0– 1,999	1	3	
2,000– 3,999	9	4	
4,000– 5,999	6	5	2
6,000– 7,999	1	2	1
8,000– 9,999		1	2
10,000–14,999		1	5
15,000 & over			5

Source: Traders Fur Record Book, Fur Export Tax Returns, Sachs Harbour, Inuvik and Fort Smith; field investigations.

This is usually done by the women and can take up to 20 minutes, although some pelts will not require any fleshing at all. A few pelts at this stage may have to be repaired or discarded. They may be found to be rubbed, unprime, wooly or otherwise of poor quality, or they may have bald patches or damaged areas which were indiscernable when the carcase was still frozen, or the hide may have been cut during skinning or fleshing. Most pelts can be repaired. Cuts are mended with a needle and thread, or patched using bits of otherwise unsaleable pelts. Unprime or wooly pelts are not wasted but used in handicraft work. Unsaleable pelts do not ordinarily exceed one or two per cent of the retrieved catch, although the general quality of the crop can vary from year to year.[1]

Pelts are then stretched on a frame, skin out, and dried – inside the house in winter, outside in spring. Stretching takes a minute or two, while drying takes at least a half day under good conditions. After removal from the stretcher, foxes are "floured", which consists of rubbing a mixture of cornmeal and flour into the fur and brushing it out. This serves to clean blood, fat and dirt stains, and brightens and fluffs out the fur. Reasonably clean pelts can be floured in five or ten minutes but dirty ones may take longer. In the latter case the addition of gasoline to the cornmeal and flour helps. Finally the pelts are hung from a clothes line, fur side out, to air out in the wind. An hour's labour per pelt is not an unusual requirement for proper processing. A few individuals choose to hire out this work, usually to women in the settlement, but occasionally to Tuk or Delta women as well. The usual charge is $0.50 per fox for each of the four main processes – skinning, fleshing, stretching, and flouring, – or a total of $2.00.

The pelts are now ready for sale, although if they are to be sold through southern auction houses, they must be baled in burlap sacks (usually fifty pelts per sack), sealed and tagged for export, and shipped by air.

Seal skins also require a considerable amount of work. The fleshing process is particularly laborious and the skins should be washed before stretching, although

[1] This can depend on weather and snow conditions; for example foxes are often rubbed (i.e. close cropped with no guard hairs) on their shoulders and flanks from burrowing in the snow in years when it is coarse and icy, or has a crust.

there is no process akin to flouring after stretching. $2.00 to $2.50 is commonly paid for the entire process if it is hired out. Bear skins can take three hours to flesh and careful stretching is necessary to ensure the proper shape.

Sachs Harbour trappers have a reputation for carefully and thoroughly prepared pelts. This has helped to earn them above average prices for their furs. Even if a trapper pays to have his furs prepared, the increased return more than covers the cost.

The marketing of pelts and skins

Unlike many other producers of raw furs, the Bankslanders are in the enviable position of having several outlets. There is a local trading post, two stores in Inuvik (although almost all of the Banksland trade goes to one of these), and three auction houses in the south with whom the trappers conduct business.

The Bankslanders trade about one third of their furs by value within the N.W.T., and export the rest (Table 3.7). Every trapper splits his sales at least two

TABLE 3.7

Destination of furs taken on Banks Island, 1964-67 (by percentage of total value)

Destination	1964-65	1965-66	1966-67	Three year mean
Sachs Harbour	28.1	21.8	11.6	17.0
Inuvik	14.0	11.4	17.2	15.3
Edmonton	45.4	55.3	56.1	53.9
Montreal	3.4	9.1	11.0	9.2
Vancouver	6.2	1.4	1.9	2.6
Other[a]	2.9	1.0	2.2	2.0

[a]Refers to local sales to private individuals, sales in Holman Island or Tuktoyaktuk, and exports to other auction houses.

Source: Traders Fur Record Book, Fur Export Tax Returns, Sachs Harbour, Inuvik and Fort Smith, N.W.T.

ways, and some sell to as many as five different traders or agents. Yet they are by no means operating in a perfect market. Most trappers and particularly the better ones, consider Edmonton their prime market. They have long dealt with an agent of the major auction house in that city. Not only do they send their furs to this agent, but they also order their outfits at Edmonton retail or even wholesale prices through him, and he also handles the shipping of these goods. This arrangement is of great advantage; the trappers obtain goods at lower prices than in the north, and they usually realize a greater net return on their furs, despite a six per cent commission on sales, a small drumming and cleaning charge, the fur export tax[1] and the air

[1] $0.50 per fox and $5.00 per bear, no tax on seals. These taxes were abolished on July 1, 1967, by decision of the N.W.T. Council.

freight (see Table 3.8). The trappers send their best furs to auction, and trade the poorer ones locally.[1]

TABLE 3.8

Cost of furs and skins f.o.b. selected locations

	Fox	Seal	Bear
Sachs Harbour	$4.34	$ 9.15	$50.67
Inuvik[a]	4.52	9.93	55.17
Edmonton[b]	5.50	11.26	68.00

[a]Includes shipping costs

[b]Includes shipping costs, export tax and six per cent sales commission

Source: Table 3.2, field investigations.

Every trapper trades at least some of his fur in the settlement. Those who for some reason cannot get credit in Edmonton (and this is rare) are forced to trade all their fur locally. Yet even the most prosperous like to keep some fur to trade at the local store for immediate needs, shortages if personal outfits run low or arrive late, or for special trapping and travelling gear which only the local trader carries. A few trappers also prefer to conduct a significant part of their trade with one of the Inuvik store keepers. There they can obtain high credit ratings against which they can obtain large amounts of cash on short notice when in Inuvik. This facilitates transactions for gear or other items with private individuals in the Delta, as well as the financing of gambling debts, drinking parties, or other locally incurred obligations.

The Bankslanders deal with three major auction houses and occasionally one or two others. When possible, they try to send their furs where they will bring the best price, although this can never be certain before the auction takes place. No trapper can afford to be completely flexible, however. Selling furs is not a simple cash transaction in an open market since credit, and all the commitments that implies, is also involved. To the degree that the trapper wishes to maintain a high credit rating, he must be a reasonably regular and reliable client of one particular trader or auction house. Since this credit rating is essential to his operation, he must sacrifice some freedom in the market place in order to guarantee his security. Accordingly, most furs are sent to Edmonton, where the trappers can obtain the best credit terms and services.

The other auction houses however, provide certain specific advantages. Credit for furs shipped to the Hudson's Bay Company auctions in Montreal can be tranferred directly to the Tuktoyaktuk store, where some trappers prefer to purchase certain major items such as canoes and outboards. The highest prices for bear skins are usually realized through a Vancouver auction house, and most Sachs

[1]During the years 1964-67 the fraction of pelts directly exported was just over one half by volume but over two thirds by value. Some of this differential was admittedly accounted for by the higher prices offered outside.

Harbour bears are ultimately marketed there. Once furs have been consigned the trappers can only await their statements and hope for the best, although on occasion, if they receive reports of major price differentials between auction houses they will withhold the unsold balance and request its transfer to the more favourable location.

Private transactions are made with transient white residents or visitors for a small number of pelts as souvenirs or garments. This usually amounts to no more than one or two per cent of the turnover in fox pelts, and perhaps slightly more of the seal skins. Bear skins are more likely to be sold in this fashion, but the majority are marketed through traders and auction houses.

Greater returns are realized on exports, but there is inevitably some delay. If a trapper sells locally, he can realize income on a piece of fur as fast as he can skin and stretch it. If he sends his fur to an auction house, he may wait several weeks and even months before they are sold, although if he is a big and reliable customer he can receive advances[1] on his shipments. Most trappers in Northern Canada have not been able to afford the luxury of delaying realization of income by sending their furs out.[2]

Figure 3.3 indicates the time-lag between the harvesting of furs, realization of income from local sales, and from exports. In fact unless credit is advanced, income is not necessarily realized in the same month that furs are exported although the bulk are sent out in time for the major auctions which occur every month or so during the season. Unless a large proportion of furs go unsold at any particular auction, income is normally realized within eight weeks of shipment from Sachs Harbour, and usually sooner. The curve for local sales indicates how these cover immediate needs, holding more or less steady over the winter and spring, and declining in summer. This pattern is typical. The curve for exports, on the other hand, indicates the delayed realization of income. The 1966-67 pattern was somewhat unusual, having two peaks. As mentioned in Chapter One, there was a general attempt to export a large quantity of furs for the January auctions. The vast number of furs and the need for postseason trips inland to bring them to the settlement resulted in the delay of the export peak to June and July. Normally there is only one peak, which occurs in late winter and early spring, since in most years it is possible to have prepared and exported almost all furs within a month of the end of trapping.

There is a reputed tendency for the market to open strongly in the winter and weaken in the summer months. The trappers therefore try to send their furs out as early as possible. The rush to export in January 1967 represented an attempt to avoid glutting a weak market in summer.

It is apparent that the Bankslanders have a far more advantageous marketing system than do most northern trappers. Nonetheless, it is still characterized by particularism, since many of the benefits of this system accrue from personal

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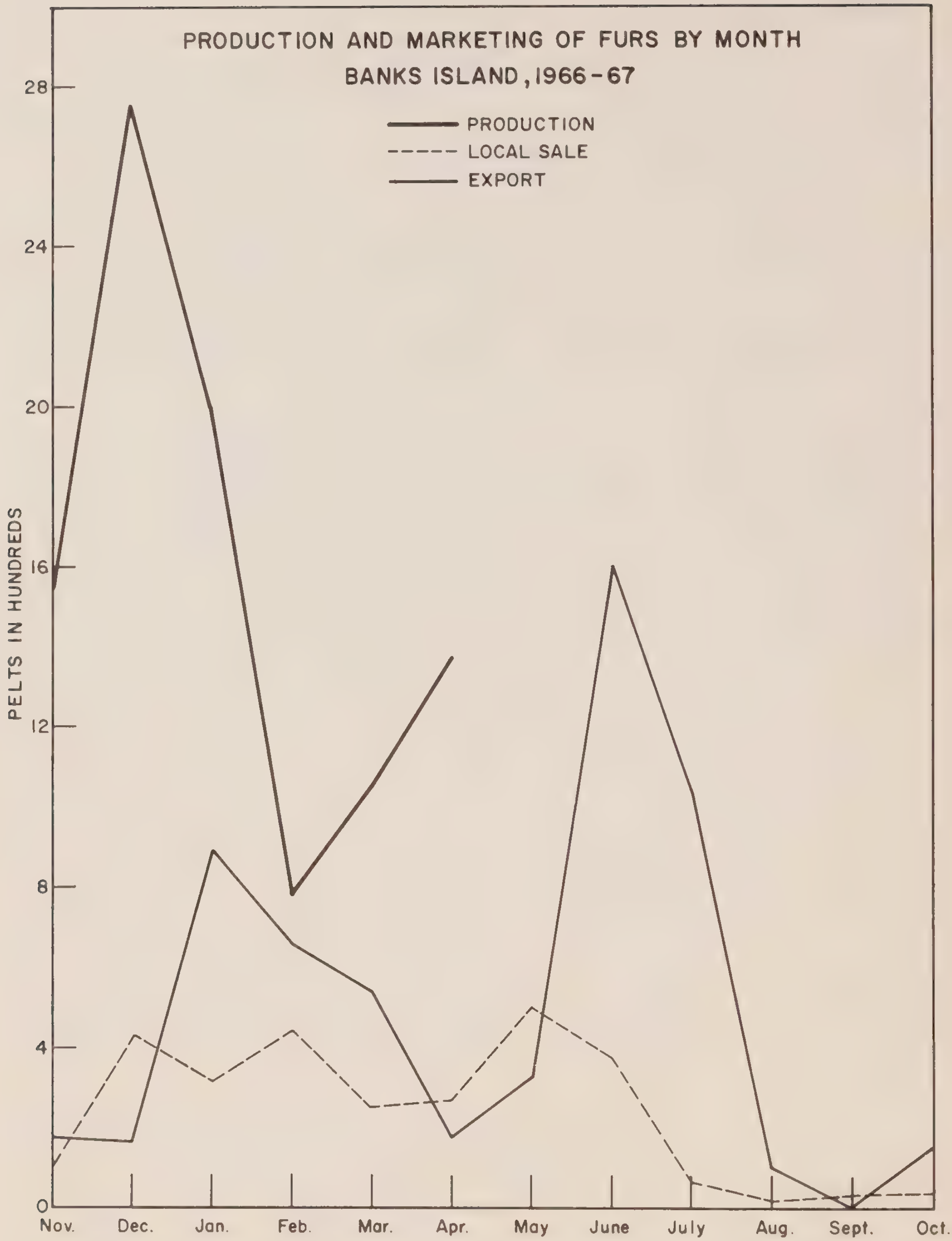
[1] Advances are partial payments by auction houses for furs received but not yet sold. They are not to be confused with credit, where the trapper is given money on the strength of his ability to deliver furs at a future date.

[2] The recently introduced system of advances in the N.W.T. has been referred to in Volume One, Chapter One,

Figure 3.3


PRODUCTION AND MARKETING OF FURS BY MONTH
BANKS ISLAND, 1966-67
PRODUCTION
LOCAL SALE
EXPORT
PELTS IN HUNDREDS
28
24
20
16
12
8
4
0
Nov.
Dec.
Jan.
Feb.
Mar.
Apr.
May
June
July
Aug.
Sept.
Oct.

knowledge and acquaintance. In Sachs Harbour and Inuvik the trappers depend on small trading posts, each owned and operated by a single person, and in Edmonton they rely on one individual agent in a local auction house. Should any of these cease to play an active role, or their enterprises fail, the Bankslanders would have great difficulty making alternate arrangements. The present marketing structure, advantageous though it is, is tenuous and perhaps impermanent.

Income in kind

The problem of evaluating income in kind has not received much serious attention in the context of northern trapping and hunting economies. However, appropriate methods have been evolved in agricultural economics, and it will be useful to examine these and establish their relevance to the northern case.

The Dominion Bureau of Statistics has a standard procedure for estimating income in kind as a component of farm income (Canada, D.B.S., *Farm Income*, 1958). There are two sources of farm income in kind. The first ". . . represents the value of that produce grown by farm operators and consumed in the farm home. . . .valued at its alternative market price, i.e. the price the farmer would have received had it been sold." (ibid., 16). This includes food stuffs, wool and forest products; the domestically produced and consumed raw materials of subsistence – food, clothing, shelter and warmth – valued at the opportunity cost of consumption.

The second source is imputed house rent (maintenance cost), calculated on the basis of repairs, depreciation, return on investment and taxes. D.B.S. considers house rent as income in kind since these costs are already included in the totals for all farm buildings in farm business expenditure, despite the fact that they are family living costs and not true business costs. Instead of deducting them from general farm operating expenses, they are added to income in kind as an equivalent. Between 1926 and 1957, imputed house rent accounted for roughly one third of farm income in kind in Canada.

Two objections may be raised immediately to applying this methodology to northern subsistence income. Country produce in the north is not harvested in the context of a cash or market economy. Since commodities are not generally sold either on a local exchange or a commercial basis, the alternative sale value cannot always be ascertained. Second, there are no buildings (other than occasionally a small frame tent as a warehouse) involved in local resource production, and therefore rents, imputed or actual, do not enter into the calculation of production or business costs. The family dwelling is thus more properly treated as a family expense, and thus does not appear on the income side of the ledger.

Attempts to evaluate country produce in non-agricultural subsistence economies have been few and inconsistent. Dyke (1968:36) in a study of the household economy of outport Newfoundland, has used opportunity costs in some instances. In a recent study of Alaskan native resources (Federal Field Committee. . .1968:292) values were assigned to country food on an unspecified basis. A reference paper on the N.W.T. (Canada, Department of Northern Affairs. . .1965:107) used substitution costs but failed to distinguish between dogfeed and human food. Substitution costs

have been used previously by the author in a study of the Coppermine-Holman region (Usher 1965:224).

Three methods suggest themselves in determining the value of country produce. The first is to use local exchange rates, i.e. what trappers and hunters exchange commodities for between themselves. Such transactions do not always occur, and if they do, they may be in fulfillment of more or less obligatory bonds, in which case cash value can not be readily ascertained. The second is the commercial value paid to producers; for example the landed value of fish in a commercial fishery. This is in fact the opportunity cost of domestic consumption, and the method used by D.B.S. for farm income. Again, data are not always available since the production of many commodities is purely for domestic purposes.

The third method is to use substitution costs. If a man did not or could not obtain seal or caribou meat, how much would it cost him to feed his family and his dogs? The complication lies, of course, with what is to be substituted, since there are often several possibilities. Caribou meat for example, could be replaced by cheap protein substitutes such as beans, or by more expensive ones such as tinned meats, or by the most similar foods, which would be more desirable in terms of cultural preference and taste, such as fresh or frozen beef, pork or reindeer. The guiding principle should be to substitute those commodities which would be the most likely substitute in view of local preference and economic capabilities. Indeed, the individual might wish to purchase the very item he is not producing. In such a case, substitution costs would equal either the local retail price of this commodity, or its local exchange value.

The three methods are compared in Table 3.9, using data for Sachs Harbour. The fact that local exchange values are relatively low is *prima facie* evidence that non-economic considerations are operative in these transactions, so that they

TABLE 3.9

Values of country produce, per pound

Item	Local exchange value (approximate)	Commercial landed value	Substitution cost (or retail price)
Seal	.10	n.a.	.22[a]
Caribou	n.a.	.30[b]	.50[b]
Ptarmigan	n.a.	.40[c]	.55[c]
Fish	.10[d]	.25[c]	.35[c]

n.a. – not applicable or not available.

[a]Substitution cost based on equivalent cornmeal and tallow value.

[b]Based on Mackenzie Delta reindeer herd operations. Price paid to producers is approximate and was derived from Hill, 1967. Retail price applies to Mackenzie Delta outlets.

[c]Based on price paid to producers and retail costs respectively, in the Mackenzie Delta (D.G. Smith, personal communication, 23 April, 1969).

[c]Exchange value in Mackenzie Delta (D.G. Smith, ibid). No value is available for Sachs Harbour.

Sources: as cited; field investigations.

provide unsuitable data for the present purpose. Alternative market price, or opportunity costs, while appropriate in the market economy, can seldom be obtained in the north since traffic in local commodities is rare. Substitution costs are therefore the most appropriate index of income in kind, on the grounds that data can always be derived, and that the individual would indeed have to substitute the commodity if he did not produce it himself.

At Sachs Harbour the substitutes for seal meat are cornmeal and tallow, since they are cheaper than purchasing fish from the mainland and almost as desirable. The most appropriate substitute for caribou is reindeer meat sold commercially in the Delta. Similarly the values ascribed to birds and fish are their retail values in the Delta (deemed the nearest point where such commodities are retailed). For present purposes, shipping costs from the Delta to Banks Island can be ignored.

Thus, according to Table 3.9, seal meat (and other marine mammals if harvested) has a value of $0.22 per pound. Caribou meat is worth $0.50 per pound, and this would apply to bear meat and, for the lack of other data, to hares as well. The example of ptarmigan values ($0.55 per pound) and the local regard for goose meat would suggest that these two fowl at least are considered a higher quality food and thus have a higher substitution cost than caribou. Fish are valued at $0.33 per pound. Considering the mix of food sources at Sachs Harbour, a general value of $0.25 a pound may be placed on all dogfeed, and $0.50 per pound on all human food. Accordingly, typical income in kind per trapper is $1,157 in dogfeed and $800 in human food, for a total of $1,957 per annum (See Table 2.12). This source of income is generally constant.

Since no clothing or warmth values are derived from country produce, the calculation of income in kind is restricted to food value alone. Pelts and skins are rarely used for clothing at Sachs, except for trim, and seal oil is no longer used for heat and light.

Profitability of trapping and hunting

Table 3.10 indicates the gross profits reaped in the major economic pursuits of the Bankslanders. It may readily be seen that under normal circumstances, trapping is not only the chief source of income but also the most profitable activity. Even an extremely poor catch should cover trapping costs, as the latter are equivalent to less than 40 foxes at current prices. Other fur bearers certainly supplement cash income but are by no means as profitable per unit. Indeed seal skins have lately become unprofitable; the mean price given in Table 3.10 includes the peak years of 1963-65, whereas presently most skins are going for $10.00 or less. This is well below the break-even sale price in Edmonton (see Table 3.8) and allows little or no profit locally. However, a seal provides over $10.00 in food value, and so as long as this food is essential, the sale of the skin increases the return on an investment already made in any case. Gross profit on the whole animal is almost $20.00, and if its primary use is for food, only the shipping costs and commission can be legitimately charged against the skin (if indeed it is exported at all). If both meat and skin are utilized, sealing is quite profitable. If the skin had little or no sale value, it would be profitable to hunt sufficient seals for dogfeed and no more. If seal meat were no longer necessary (e.g. with the advent of mechanized transport) and skins did not

TABLE 3.10

Gross profits on country produce, Banks Island

Commodity	Cost ($)	Substitution cost or sale value[a] ($)	Gross profit ($)
Fox pelt	4.34	22.00	17.66
Bear skin	50.67	145.00	94.33
Seal skin	9.15	17.00	7.85
Seal meat, per edible lb.	.17	.22	.05
Caribou meat, per edible lb.	.12	.50	.38
Fowl, per edible lb.	.05-.27	.55	.28-.50
Fish, per edible lb.	.58	.35	-.23
Dogfeed, all types, per edible lb.	.17	.25	.08
Human food, all types, per edible lb.	.16	.50	.34

[a]Substitution cost used for meat products, recent (1963-67) approximate average prices paid to producers used for furs and skins.

Source: Tables 3.2, 3.9.

sell for at least $10.00 to $12.00, sealing would be unprofitable and the capital equipment used for it would become a liability rather than an asset.

With regard to food production in general, the profit on human food is much greater than that on dogfeed. Both caribou hunting and fowling (all types) yield an excellent gross profit, although interestingly enough, fishing is done at a considerable loss on a per unit basis.

The fact that certain pursuits are conducted at little or no profit, or even incur a loss, demonstrates both the integration of all the separate activities into a way of life that is not neatly divisible, and that profit is not the sole or even the most important motivation for certain types of behaviour which are normally characterized as "economic". Fishing for example, is done because it is an enjoyable diversion and brings a welcome variation to the diet. Goose hunting would occur even if it resulted in considerable loss, for the same reason. Decision making with regard to the major activities (fox trapping, sealing, caribou hunting and bear hunting) is more likely to occur with profit considerations uppermost, although the trappers may also derive non-economic gratifications from these pursuits. Secondary pursuits such as fishing and fowling have a higher entertainment or diversion component, so that strict economic considerations may be overridden. Within this integrated life way, however, there is a rank ordering of hunting and trapping activities. Trapping is clearly the most important of these, followed by sealing, caribou hunting, bear hunting, fowling and fishing. These generally occur at distinct seasons, so that there is little conflict between them, but in the event of conflict there is little doubt about priorities. The above ranking may vary slightly with the seasons; for example, the relative priority of sealing and caribou hunting will shift as the autumn sets in. The chief limiting factor which the trappers themselves would perceive is time (which

itself is a function of long term need and is in effect seen as an opportunity cost). For example, fishing will be conducted not with regard to its economic return, but rather to its relationship with seal hunting. So long as sealing is going well, and the trappers have no fear that they will not ultimately be able to obtain the requisite harvest, they will set fish nets during the run. Again, if sealing became unprofitable in gross terms, the men would still hunt in the summer so long as they had the equipment and there was no alternative activity. They would do so not simply to utilize an existing capital investment, but because they enjoy it and would rather hunt than do nothing, even at a cost. The limiting factor is time, not money. While there is a limit to the economic loss they would be prepared to sustain, the principle remains that gratifying activities will be curtailed in response to demands on time sooner than on money.

Total gross and net income[1]

Gross trapping income includes cash receipts from sales plus all income in kind. Mean annual cash income from furs for full time trappers at Sachs Harbour for the years 1963-67 was \$6,296, plus \$1,957 in kind for a total gross of \$8,253. Other sources of income contributed to total gross earnings of \$8,583 per trapper, for an annual per capita income of \$1,786. This was considerably above the averages for the N.W.T., the Yukon and the Atlantic Provinces, and compared with \$2,069 for Canada as a whole during those years.

Net trapping income (i.e., imputed wages from trapping) can also be derived, in broadly the same manner that farm net income has traditionally been calculated by D.B.S. (*Farm Income*, 1958). Operating expenses and depreciation charges, plus in this case net income in the form of dogfeed, is deducted from gross trapping income.[2] Mean annual net trapping income at Sachs Harbour for the period 1963-67 was \$6,137 per trapper. Assuming income in kind, and depreciation and operating costs to be reasonably constant, net income varied from approximately \$3,500 to \$13,000 during the four years. The latter represents an unusually high figure, while per trapper net income could dip as low as \$1,500 in a poor year if not mitigated by the sale of seal skins as in 1964-65.

The long term average, even if slightly lower than the figure of \$6,137 for 1963-67, compares very favourably with other incomes in the Canadian salary and

[1]In the following two sections, which attempt to evaluate local income and expenditure and compare these to other occupational groups and geographic regions in Canada, the problem of family size has been ignored. The average family at Sachs Harbour is rather larger than the national average (see Volume Three, Chapter One), but until 1968, many children lived ten months of the year at residential schools in Inuvik. The resulting reduction in residential floor space requirements and in food expenditures achieved by the trappers meant that their effective number of dependents more closely approximated the national average. The establishment of the day school at Sachs Harbour has had the effect of reducing per capita earnings, and has hence increased the strain on family budgets. This development is discussed more fully in Volume Three.

[2]The distinction between total and realized gross farm income does not apply to trappers and hunters since there is never an appreciable inventory of unsold or unconsumed produce whose net change at year-end must be calculated in the total. Supplementary payments and subsidies are not normally available to trappers and hunters, and do not enter into the calculations of income. The problem of buildings and rents has already been discussed.

wage structure. Farm income is difficult to ascertain on a per farmer basis, but Sachs Harbour trapper income certainly exceeds it.[1] It is also well above the average income in the fishing industry, where gross receipts per man in the primary sector amounted to $3,807 during the 1962-66 period (Canada, D.B.S., *Fisheries Statistics of Canada,* 1962-66). Converted to an hourly basis for a standard work week (forty hours), Sachs income, at over $3.00 per hour, is above the national average in industry ($2.39 in June 1967 – Canada, D.B.S., *Annual Supplement to the Canadian Statistical Review, 1967*). It compares favourably with the most skilled rates for such industries as pulp and paper, iron and steel, aircraft production, and trucking (non-operators), which are in the $3.00 to $3.50 range. They are distinctly higher than those for such industries as underground mining, food and textiles (Canada, Dept. Labour,1967), and are about double those for farm labour (Canada, D.B.S., *Farm Wages in Canada*, 1968). Needless to say, trapper income also exceeds that of large numbers of salaried people in sales and services and in the lower ranks of white collar employment. It must also be noted that due to certain advantages with regard to taxation customarily enjoyed by land based northerners, disposable income is even higher relative to that of the aforementioned occupational groups.

In terms of income, there is clearly no opportunity cost for trapping on Banks Island. It is true that many trappers, although highly skilled in their own trade, have few or no marketable skills were they to give up trapping. It is noteworthy however, that even with retraining, vocational education, or a significant upgrading of academic skills to the matriculation level, there would still be no (or at least inconsequential) opportunity costs in terms of the kinds of employment and income levels to which these skills could provide entry.

Personal expenditure

The Bankslanders need not worry about the basic necessities of life, and indeed enjoy a very comfortable standard of living. Such judgements are relative of course. Compared with other native northerners, the living standards of Sachs Harbour people are very high. Comparisons with other peoples and places in Canada are more difficult because the spending priorities are different, as well as the necessity of considering intangible values concerning the "good life".

Table 3.11 indicates that a normal expenditure of $5,400 per annum is required to maintain the standard of living that most trappers now enjoy on Banks Island. In lean years, expenditure can be cut back, but first we will examine the breakdown of expenditure.

Capital equipment has already been discussed. A long term average expenditure of almost $1,300 is required, although if necessary this can be cut back to the operating costs alone, which are almost $850.

[1] Realized net income per census farm (excluding house rent) was $2,801 in 1966 (excluding Newfoundland). However about one third of all farms were non-commercial (gross sales of $2,500 or less) so that this is a distinct underestimate of net income for full time farmers. Gross sales by commercial farms for 1965 were almost $11,500 per farm. Realized net income averages roughly one third of realized gross on all farms; if this holds true for commercial farms, their net would average about $4,000 (Canada D.B.S., *Farm Net Income,* 1967; *Census of Canada,* 1966).

TABLE 3.11

Annual and cyclical family expenditures, Sachs Harbour

Item	Annual expenditures		Cyclical (four year) expenditures	
	Normal	Minimum	Assumption A	Assumption B
Capital equipment	$1,300	$ 650	$ 5,200	$ 5,200
Food (exc. dog feed)	1,200	1,000	4,400	4,200
Shelter	300	50	1,200[b]	1,200[b]
Heat and light	600	500	2,200	2,100
Furniture and household goods	500	100	2,000[b]	2,000[b]
Clothing	500	300	1,800	1,700
Transportation and communication[a]	400	50	900	700
Tobacco and alcohol	300	200	1,000	900
Miscellaneous	300	100	900	800
Total	$5,400	$2,950	$19,600	$18,800
Mean	n.a.	n.a.	$ 4,900	$ 4,700

[a]Does not include local dog or snowmobile transport.

[b]Since these items have, in general, a life of longer than four years, the full level of expenditure is not necessarily required in any given cycle, although for ease of presentation they have been given as such.

n.a. – not applicable.

Assumption A – Two years at normal expenditure and two at minimum, adjusting for fixed and variable long term costs.

Assumption B – One year at normal expenditure and three at minimum, adjusting for fixed and variable long term costs.

Food represents a relatively fixed cost for any family, although expenditures can be reduced in poor years (see Appendix F). Despite the fact that freight charges add 20 to 25 per cent to southern Canadian prices, the availability of country food allows Sachs Harbour people to eat very well indeed in terms of both nutrition and local tastes, on a food budget comparable to that of a middle class family in southern Canada.

Shelter is cheaply obtained at Sachs, since there are no land costs, rents or property taxes. The size and style of houses are modest by southern standards, although well above that of other northern communities before the Federal Government commenced its Arctic-wide housing programme.[1] They are comfortable and adequate by local standards, which is the most important measure. The cost given in Table 3.11 is calculated on the basis of an initial investment of $3,000 in building materials for a house which will last 15 years, and $1,500 worth of improvements during its life. Accordingly, annual costs can be quite flexible, although in the long run the $300 average must be maintained. Heat and light are on the other hand very expensive, and represent virtually fixed costs.

[1]This program had not been extended to Sachs Harbour due to lack of need. New developments during 1969 and 1970 in this regard are discussed in Volume Three.

Furniture and household goods, and clothing, can be quite variable expenditures and cover a wide range of items (including tools – many men have accumulated several hundred dollars worth of high quality tools for construction and repairs). The purchase of major pieces of furniture and appliances are of course quite irregular. Certain basic items of clothing however, are fixed. People do not maintain large and varied wardrobes, and much clothing is handmade, but the raw material for outer clothing such as duffle, grenfell, moose hide and wolverine are very costly, and parkas, mitts and mukluks are heavily used and short lived.

Since the cessation of summer schooner voyages, most families have attempted to get to the mainland every couple of years or so by plane. Sometimes only the man goes, but on other occasions the wife and even the children will make the trip. Aircraft are often chartered, (frequently on a joint basis) to bring in supplies, ship out furs or stock the traplines. Communication with the mainland for family or business purposes by telegraph, and more recently by telephone, is a small though frequent expense.

Finally, the majority of Sachs Harbour adults are smokers, and consume alcohol as well, and these items as a component of family expenditures are very similar to that of the average Canadian family.[1] Miscellaneous expenditure includes such items as movies, community association membership, magazine subscriptions, toys and records.

Some of the outlets for spending and credit have already been mentioned in the section on marketing. A few further remarks on the transactional framework are offered here. Most transactions take place without cash, since dealings with both local storekeepers and outside auction houses are on account. The trappers can also instruct their credit holders to pay for certain local purchases such as fuel and aircraft charters. However, many items of capital equipment, clothing and household goods are purchased C.O.D. by catalogue through mail order houses (C.O.D. purchases have amounted to over $700 per family per annum in recent years). Movies, telegrams and fur royalties also require ready cash. Private sales of furs and handicrafts, and the leftovers from trips to Inuvik bring cash into the settlement, but it is usually in very short supply.

Table 3.11 also shows the degree of flexibility in the expenditure pattern. While an annual cash income of $5,400 is desired to maintain the standard of living, in any given year, family expenditures can be reduced below $3,000 without impairing their long term standard.

In such a case, all purchases of new capital equipment, building materials and household goods are deferred, trips to the mainland forgone, and consumption of food, fuel, clothing, alcohol etc., reduced to the minimum tolerable level. To cut expenditure below this level could result in malnutrition of people and dogs, considerable discomfort, and impaired performance in hunting and trapping.

It is probable that some such paring will have to be done at least once in the four year cycle. It is possible that this will be necessary for two or even three of the four years. The consequences of this are shown in Table 3.11. It will be seen that

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[1] There is no liquor outlet in Sachs Harbour, and orders must be placed in Inuvik and shipped by air.

over the cycle, even if it is a lean one, the average annual level of expenditure cannot be reduced drastically from the "normal" rate (i.e. where pared expenditures are not required at any time in the cycle.) In the long run, a family simply cannot get by with an annual cash income of much less than $5,000. This refers, of course, to what is locally perceived to be a reasonable standard of living, and not to a subsistence level existence. Nor will all families have to reach this level, but the younger and more ambitious ones will if they are to make their life on the Island.

When expenditure must be held back in poor years, there will be major outlays in good years. Major investments in trapping and hunting equipment, household furniture and appliances, housing starts or improvements, inter-community travel and aircraft charters are characteristically cyclic in a white fox economy. The trappers speak of "going ahead" in these years. Liquor consumption and gambling increase both locally and on trips to the mainland, where conspicuous consumption is one of the gratifications of having had a good year.

Beyond these normal cyclic occurrences are years, and particularly cycles, when income is considerably above the adequate norm, as has recently been the case. This has not happened often on Banks Island, and the consequences of such events are not entirely clear since they occur in the context of other changes as well. Very possibly they presage significant new stages in the development of the community. To some degree the surplus may be held over as credit against the new cycle, but as will be noted below, saving is not an outstanding feature of the Sachs Harbour economy. There is also some dissipation of the surplus, by a few trappers at least, in the form of bigger and better sprees on the mainland. However, some capital is invested in significantly new ways beyond the normal catching up on equipment and supplies noted above.

There are some historical precedents. Both the initial few years of settlement and the 1937-41 period were unusually prosperous, and resulted in considerable investment in schooners and capital equipment, which greatly assisted in the development of a corps of first class trappers and in the successful colonization of the Island. The prosperity of the years 1958-61 coincided with the decline of schooner travel and resulted, among other things, in permanent housing and a local demand for more frequent and regular air services. Lean years at the time of this critical transition could have resulted in the failure of a viable permanent settlement. The present surplus may herald the successful introduction of mechanized transport, since almost all trappers indicated that they would be purchasing motor toboggans in 1967.[1] Although the technological context is new, such investment decisions are reminiscent of earlier days when the trappers were just as quick to seize new opportunities in their quest for a secure and satisfying livelihood on the Island.

The economy: savings and credit

Long term savings are insignificant in the local economy. Only seven individuals had bank accounts in 1967. Of these, two were women who received considerable

[1]The impact of increased use of mechanized transport on Banks Island since 1967 has been documented elsewhere (Usher, 1970).

monies from handicraft production, one was the local store keeper, and two were in wage employment. Thus only two men who live entirely by trapping had accounts. In some cases these bank accounts served primarily as repositories for inheritance money received in trust a generation ago. Most accounts are small since the level of savings generated by trapping is low.

As a result there is little or no capital available for enterpreneurial activity or community investment. This is why it has been possible to examine the economy through the household unit. The community economy is essentially the sum of a number of more or less successful household operations or enterprises. There is no pool or flow of capital which exists or operates above this level requiring a super household institutional structure for its administration.

Two exceptions may be noted. First was the ability of one individual to accumulate sufficient capital (or at least obtain financial backing) to open a small store a decade ago. This was most unusual in the context of a trapping economy, and it was important in the establishment of the permanent village. Secondly, since the establishment of the Community Association in 1965, there has been a modest but steady accumulation of capital for community purchases and enterprises.

The lack of savings is also important in understanding trapping as a family enterprise. This discussion must be qualified by noting that very few people have died a natural death of old age on the Island since they generally returned to the mainland upon retirement, and the many external economic and social changes have not resulted in a stable population in which the transfer of enterprise from one generation to the next can readily be observed. We therefore present a model of the family enterprise rather than an empirical review of actual cases.

During the course of a man's trapping career, he saves very little money in the normal sense. Surpluses are used to build up the stock of capital goods, to build, improve and expand the family dwelling, and to purchase or replace major household appliances and furniture. If the trapper is about 25 years old at the birth of his first son, he will have an apprentice and assistant to help him on the trail when he is 40. Many trappers see this as potentially the peak of their career – a time when they are still strong and healthy, and in a position to reap the benefit of accumulated knowledge and skill, a good stock of equipment and the energies of a young son still part of the family. Five or ten years later, the son will be on his own, and if he still traps in partnership with his father it will be as an equal, at least in the sense that neither the productive equipment nor the proceeds of the venture are shared. As the old man slows down, he can no longer handle all his equipment, and so passes some on to his son who needs it to get a start. Since the older man's trapping life is now not much longer than that of his equipment, what is left is allowed to depreciate. To some extent this is true of the house and furnishings as well. The son may live at home immediately after marriage but will want to build his own house long before he can inherit his parents'.

Thus, when a man dies, it is rare that his estate can be converted into cash. He almost certainly has no cash or liquid assets, and will have long since used up any credit he may have had with storekeepers or auction houses. He may have a house, furnishings and a modest stock of capital equipment, but all are distinctly secondhand, and since they either cannot be transported out of the community or

are not worth it, the only market for them is the very restricted local one. Such an inheritance has little other than sentimental value to the children.

The result is that every generation of trappers starts virtually from the beginning in terms of physical assets. The trappers' legacy lies in how well he teaches his son to trap and hunt, to survive on the tundra, to be a strong, self-reliant and proud individual. The intangible legacy can be priceless, the physical one is often valueless. Unlike the family farm or family business, where cleared land, livestock, machinery, buildings, inventories and customer goodwill can be passed on, capitalization in trapping, although high, depreciates so rapidly that nothing remains at the end of a career. Not surprisingly this contributes to a much less stable situation with regard to the maintenance of the family enterprise through generations. Since the sons start virtually afresh, there is no opportunity cost for failing to trap, should more attractive alternatives be available.

In view of the cyclic nature of the economy, and the lack of savings, the role of credit becomes clear. It is the essential means of financing through the lean years. There are years in which many families do not earn the minimum requirement of $3,000. In such years the extension of credit, often in substantial amounts, tides people through for perhaps two, three or even more years until a good year allows them to pay their debts. Beyond this, credit allows people to maintain themselves above the minimum, and to make essential purchases when circumstances would not otherwise permit (i.e. if a new outboard is needed during the low part of the cycle). The Bankslanders are fortunate in dealing with a firm in Edmonton which will allow them several hundred dollars (even several thousand, on occasion) in long term credit, beyond what they can obtain locally. An important factor in the success of the trapping colony on Banks Island has been the nearly unbroken access to large amounts of credit, from backers who have recognized the competence of the trappers and the abundance of their land.

Most northern trading posts do not nowadays extend nearly enough credit to maintain a trapping economy such as the Bankslanders'. Although in lean years the Islanders have collectively owned tens of thousands of dollars, they have generally found that, given some good seasons, their debts can be paid off, and they are not in eternal servitude to their creditors (contrary to the pessimistic view expressed on this subject in a previous report – Usher, 1966:106).

The health of the economy can only be measured on a cyclic basis. So long as income covers expenditure over the cycle, the trappers remain reasonably secure. It is always possible that as a result of a drastic fall in fur prices, debts contracted at the beginning of the cycle could not be repaid by the end. This however, would not be the fault of the credit system but rather of world fur market conditions. In the Bankslanders' experience, the credit basis of the trapping economy has been the essential financial mechanism for the maintenance of the community.

APPENDIX A

TRAPPING STATISTICS

TABLE A.1

Pre-season trapline preparations, 1966

	Summer											Autumn				
	Airplane Charter	Canoe Travel		Materials Cached				Toggling				Materials Cached				
Trapper number	Cost ($)	Cost ($)	Time (days)	Cornmeal (lbs.)	Fuel (gals.)	Other[a]	Seal (approx. weight, lbs.)	Miles of line	Number of traps	Days out	Days toggling	Cornmeal (lbs.)	Fuel (gals.)	Other	Caribou[b]	Seal (approx. weight, lbs.)
004	39			150	10											
008		20	3	350	30		750									
010	58			300	20			155	647	20	9			X	X	20
013								15	30	3	2					
015								40	50	14	5				X	
018		18	5	150	30		1145									
020		18	5	150	30		1280									
021		20	3	300	30	X	885	30	150	5	3	150	10			175
022	39			150	10											
023	46			450	5	X										
Totals	182	76	16	2000	165	X	4060	240	877	42	19	150	10	X	X	195

[a]Other includes chiefly items of store bought goods such as tea, sugar, butter, macaroni, etc., but also traps and other gear.

[b]As many fall killed caribou are cached but later brought home, it is impossible to state how much was cached for ultimate use on the trail.

Source: Field Investigations.

TABLE A.2

Trapping effort, Banks Island, 1964-67, by individual.

trapper number	partner number	line code	toggled before season	total foxes	foxes retrieved	foxes lost	dogs	miles of line	return length	trips	days out	distance travelled	traps set	trap checks	days per trip	distance per trip	miles per day	april trap density	total fox per trap check	fox retrieved per trap check	loss rate (percentage)
1964-65																					
001	002	1	yes	58	47	11	8	80	160	4	42	560	300	1800	10	140	13.3	3.8	.032	.026	19
002	001	1	yes	190	175	15	9	93	185	6	62	960	700	6500	10	160	15.5	7.5	.029	.027	8
003	022	1	yes	80	76	4	11	55	110	3	29	330	500	2500	10	110	11.4	9.1	.032	.030	5
004	002	3	no	125	121	4	9	210	210	6	67	1060	415	2015	11	177	15.8	2.0	.062	.060	3
007		1	no	34	26	8	9	105	210	5	51	940	400	2900	10	188	18.4	3.8	.012	.009	24
009	024	5	no	121	91	30	10	153	265	5	56	1260	515	4075	11	252	22.5	3.4	.030	.022	25
010	023	1	no	60	59	1	7	110	220	4	35	770	250	1250	9	192	22.0	2.3	.048	.047	2
013		1	no	110	100	10	9	90	180	5	51	730	300	2200	10	146	14.3	3.3	.050	.045	9
015	017	2	no	59	45	14	8	125	250	5	60	1000	300	2200	12	200	16.7	2.4	.027	.020	24
017	015	1	no	38	30	8	9	50	100	4	35	400	50	350	9	100	11.4	1.0	.109	.086	21
018		1	yes	85	76	9	7	98	195	5	50	865	250	1850	10	173	17.3	2.6	.046	.041	11
020	021	5	yes	176	151	25	9	150	290	5	68	1300	600	4700	14	260	19.1	4.0	.037	.032	14
021	020	5	yes	197	172	25	11	150	290	5	68	1300	635	4895	14	260	19.1	4.2	.040	.035	13
022	004	3	no	119	104	15	9	210	210	6	67	1060	400	1950	11	177	15.8	1.9	.061	.053	13
023	010	1	no	131	96	35	6	110	220	6	59	1040	300	2500	10	173	17.6	2.7	.052	.038	27
024	009	5	no	100	75	25	8	153	265	5	56	1260	400	3200	11	252	22.5	2.6	.031	.023	25
026		1	no	110	99	11	11	100	200	6	99	1000	400	3700	16	167	10.1	4.0	.030	.027	10
1965-66																					
001	002	1	yes	180	168	12	7	150	300	7	82	1600	425	4125	12	229	19.5	2.8	.044	.041	7
002	001	1	yes	314	304	10	9	150	300	7	82	1600	800	8200	12	229	19.5	5.3	.038	.037	3
004	022	5	no	220	207	13	9	153	210	7	79	1275	550	4970	11	182	16.1	3.6	.044	.042	6
006	018	1	no	46	40	6	8	125	250	5	58	865	335	2165	12	173	14.9	2.7	.021	.018	13
009	024	1	yes	175	162	13	11	145	290	6	74	1400	500	4675	12	233	18.9	3.4	.037	.035	7
010		3	yes	473	443	30	8	265	280	6	115	1525	800	4225	19	254	13.3	3.0	.112	.105	6
013		3	no	120	101	19	12	185	185	6	65	1130	410	1820	11	188	17.4	2.2	.066	.055	16
015		1	no	60	47	13	9	73	145	5	64	605	210	1470	13	121	9.5	2.9	.041	.032	22
017		1	no	30	27	3	9	55	110	12	80	1290	100	2220	7	107	16.1	1.8	.014	.012	10
018	006	1	yes	262	244	18	8	133	265	5	68	1180	330	2620	14	236	17.4	2.5	.100	.093	7
020	021	1	yes	322	257	65	13	180	360	7	95	1920	700	7200	14	274	20.2	3.9	.045	.036	20
021	020	1	yes	347	317	30	11	180	360	7	95	1920	700	7750	14	274	20.2	3.9	.045	.041	9
022	004	5	no	182	172	10	9	153	210	7	73	1205	460	3500	10	172	16.5	3.1	.052	.049	5
023		5	yes	195	170	25	7	180	250	4	61	850	580	3060	15	210	13.9	3.2	.064	.056	13
024	009	6	no	146	136	10	8	190	380	4	72	1290	505	3435	18	323	17.9	2.7	.043	.039	7
026		1	yes	191	171	20	11	100	200	7	120	1310	600	7560	17	187	10.9	6.0	.025	.023	10
1966-67																					
001		1	no	389	342	47	10	60	120	5	65	575	600	2880	13	115	8.8	10.0	.135	.119	12
004	022	2	no	541	516	25	9	95	190	5	58	880	450	2975	12	176	15.2	4.7	.182	.173	5
008	009	1	no	394	354	40	7	120	240	5	80	1220	400	3095	16	244	15.3	3.4	.127	.114	10
009	008	2	no	641	567	74	8	155	265	6	88	1330	655	4385	15	222	15.1	4.2	.146	.129	12
010		4	yes	1011	846	165	11	192	384	5	90	1400	746	3946	18	280	15.6	3.9	.256	.214	16
013		5	yes	562	536	26	12	100	175	5	66	785	355	2445	13	157	11.9	3.6	.230	.219	5
015		2	yes	236	213	23	9	117	234	5	76	850	330	1710	15	170	11.2	2.8	.138	.125	10
017		2	no	246	233	13	10	56	112	6	65	675	240	2165	11	113	10.4	4.3	.114	.113	5
018		2	no	712	634	78	11	110	220	5	73	1080	505	3925	15	216	14.8	4.6	.181	.162	11
020		2	no	987	867	120	12	182	364	5	86	1520	746	4844	17	304	17.7	4.1	.204	.179	12
021		2	yes	974	852	122	11	171	342	5	79	1487	890	6073	16	297	18.8	5.2	.160	.140	13
022	004	2	no	539	507	32	9	95	190	5	58	880	389	2568	12	176	15.2	4.1	.210	.197	10
023		4	no	578	441	137	10	140	280	5	87	1120	670	3330	17	224	12.9	4.8	.174	.132	23
024		1	no	685	586	99	7	110	220	4	62	910	375	2500	15	228	14.7	3.4	.274	.234	14
026		1	no	1009	939	70	9	110	220	5	103	1050	573	4471	21	210	10.2	5.2	.226	.210	7

Source: Field Investigations.

TABLE A.3

Trapping effort, Banks Island, three-year mean, by individual.

Trapper number	Year with partner	Line codes (by year)	Years toggled before season	Total foxes	Foxes retrieved	Foxes lost	Dogs	Miles of line	Return length	Trips	Days out	Distance travelled	Traps set	Trap checks	Days per trip	Miles per trip	Miles per day	April trap density	Total fox per trap check	Fox retrieved per trap check	Loss rate (percentage)
001	2	111	2	209	186	23	8.3	97	193	5.3	63	912	442	2935	11.7	161	13.9	5.5	.070	.062	13
004	3	352	0	295	281	14	9.0	153	203	6.0	68	1072	472	3320	11.3	178	15.7	3.4	.096	.092	5
009	3	512	1	312	273	39	9.7	151	273	5.7	73	1330	557	4378	12.7	236	18.8	3.7	.071	.062	15
010	1	134	2	515	449	65	8.7	189	295	5.0	80	1232	599	3140	15.3	242	17.0	3.1	.139	.122	8
013	0	135	1	264	246	18	11.0	125	180	5.3	61	882	355	2155	11.3	164	14.5	3.0	.115	.106	10
015	1	212	1	118	102	17	8.7	105	210	5.0	67	818	280	1793	13.3	164	12.5	2.7	.069	.059	18
017	1	112	0	105	97	8	9.3	54	107	7.3	60	788	130	1578	9.0	107	12.6	2.4	.079	.070	12
018	1	112	2	353	318	35	8.7	114	227	5.0	64	1042	362	2798	13.0	208	16.5	3.2	.109	.099	9
020	2	512	2	495	425	70	11.3	171	338	5.7	83	1580	682	5581	15.0	279	19.0	4.0	.095	.082	16
021	2	512	3	506	447	59	11.0	167	331	5.7	81	1569	742	6239	14.6	277	19.4	4.4	.082	.072	11
022	3	352	0	280	261	19	9.0	153	203	6.0	66	1048	416	2673	11.0	175	15.8	3.0	.108	.100	8
023	1	154	1	301	256	66	7.7	143	250	5.0	69	1003	517	2963	14.0	202	14.8	3.6	.097	.075	21
024	2	561	0	310	266	45	7.7	151	288	4.3	63	1153	427	3045	14.7	268	18.4	2.9	.116	.099	15
026	0	111	1	437	403	34	10.3	103	207	6.0	107	1120	524	5244	18.0	188	10.4	5.1	.094	.087	9

Source: Table A.2.

TABLE A.4

Regression equations for trapping effort, Banks Island, 1964-67

Year	Equation	Standard error	Standard error of y
a. total foxes on trap checks, all lines			
1964-65	$y = .026x + 31$	.005	31
1965-66	$y = .033x + 61$	.011	96
1966-67	$y = .185x - 1$	.036	157
3 year mean	$y = .074x + 69$	.016	82
b. total foxes on trap checks, excluding circular lines			
1964-65	$y = .028x + 20$	.005	29
1965-66	$y = .034x + 37$	.008	64
1966-67	$y = .185x - 1$	.036	157
3 year mean	$y = .081x + 18$	.012	57
c. total foxes on traps set, all lines			
1964-65	$y = .241x + 10$	.049	32
1965-66	$y = .508x - 50$	.083	64
1966-67	$y = 1.065x + 71$	.261	182
3 year mean	$y = .721x - 13$	.114	66
d. total foxes on traps set, excluding circular lines			
1964-65	$y = .241x + 9$	.052	33
1965-66	$y = .428x - 17$	.080	57
1966-67	$y = 1.065x + 71$	.261	182
3 year mean	$y = .685x - 5$	.129	71

All regressions significant at 99 percent confidence level.

TABLE A.5

Bimonthly breakdown of effort expenditure
during the trapping season (individual means), Banks Island, 1964-67

	1964-65			1965-66			1966-67			three year mean		
	Nov-Dec	Jan-Feb	Mar-Apr	Nov-Dec	Jan-Feb	Mar-Apr	Nov-Dec	Jan-Feb	Mar-Apr	Nov-Dec	Jan-Feb	Mar-Apr
Total foxes	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	285	175	174	n.a.	n.a.	n.a.
Foxes retrieved	8	21	62	59*	55*	75*	257	155	151	108	77	96
Foxes lost	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	28	20	23	n.a.	n.a.	n.a.
Dogs	8.9	8.8	8.8	9.3	9.3	9.3	9.6	9.9	9.9	9.3	9.3	9.3
Miles of line	65	118	120	93	139	151	99	113	121	86	123	131
Return length	130	206	209	171	248	256	197	226	237	166	227	234
Trips	1.3	1.8	2.0	1.8	2.1	2.4	2.0	1.2	1.9	1.7	1.7	2.1
Days out	16	22	19	23	31	26	36	19	21	25	24	22
Distance travelled	174	354	414	296	464	550	398	244	409	289	354	457
Max. traps set	252	386	395	352	461	500	430	504	528	345	450	472
Trap checks	403	1049	1371	801	1460	2051	1126	927	1367	777	1145	1596
Days per trip	12	12	10	13	15	11	18	16	11	14	14	11
Distance per trip	133	201	207	163	218	226	199	203	219	165	207	217
Miles per day	10.8	16.3	21.4	12.6	15.0	21.3	11.0	12.7	19.9	11.5	14.7	20.9
Days out as % of season	26	37	35	44	53	57	59	32	46	43	41	46
Trap density	3.9	3.3	3.3	3.8	3.3	3.4	4.4	4.5	4.4	4.0	3.7	3.7
Total fox per trap check	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	.253	.188	.127	n.a.	n.a.	n.a.
Retrieved fox per trap check	.020	.020	.045	.071*	.039*	.035*	.228	.167	.110	.106	.072	.063
Loss rate (% of total)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	9.9	11.6	15.1	n.a.	n.a.	n.a.

n.a. – not available
*based on data for 15 out of 16 trappers

Source: Field investigations.

APPENDIX B

HUNTING STATISTICS

TABLE B.1

Typical production and use of animal foods, by month, by an average Banks Island trapper

	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Total
Seal – number	18.7	25.1	9.8	1.3	0.6	0.4	1.7	1.4	1.2	1.8	4.9	12.1	80.0
lbs. dogfeed	841	988	508	67	31	21	88	73	62	93	254	612	3638
lbs. human food	20	40	0	0	0	0	0	0	0	0	0	0	60
Total weight	861	1028	508	67	31	21	88	73	62	93	254	612	3698
Caribou – number	0.05	0.17	0.26	4.08	3.35	0.83	1.10	1.56	1.86	0.53	0.86	0.42	15.0
lbs. dogfeed	0	0	0	30	0	0	0	0	0	0	0	0	30
lbs. human food	4	14	20	296	267	65	87	125	149	41	68	34	1170
Total weight	4	14	20	326	267	65	87	125	149	41	68	34	1200
Polar bear – number	0.16	0.13	0.09	0.15	0.10	0.06	0.02	0.00	0.25	0.24	0.23	0.07	1.5
lbs. dogfeed	46	36	32	48	35	21	7	0	39	37	35	25	361
lbs. human food	10	10	0	5	0	0	0	0	5	5	5	0	40
Total weight	56	46	32	53	35	21	7	0	44	42	40	25	401
Geese – number	0	0	0	0	0	0	0	0	0	0	20	10	30
lbs. human food (Total)	0	0	0	0	0	0	0	0	0	0	70	35	105
Eider ducks – number	5	5	0	0	0	0	0	0	0	0	0	5	15
lbs. dogfeed	7	6	0	0	0	0	0	0	0	0	0	7	20
lbs. human food	6	7	0	0	0	0	0	0	0	0	0	6	19
Total weight	13	13	0	0	0	0	0	0	0	0	0	13	39
Ptarmigan – number	0	0	20	20	0	0	0	0	0	10	10	0	60
lbs. human food (Total)	0	0	18	18	0	0	0	0	0	9	9	0	54
Owls – number	0	0	10	5	5	0	0	0	0	0	0	0	20
lbs. dogfeed	0	0	36	20	20	0	0	0	0	0	0	0	76
lbs. human food	0	0	4	0	0	0	0	0	0	0	0	0	4
Total weight	0	0	40	20	20	0	0	0	0	0	0	0	80
Fish – number	0	15	0	5	0	0	0	0	0	0	35	0	55
lbs. human food (Total)	0	35	0	12	0	0	0	0	0	0	60	0	107
Arctic hare – number	0	0	0	0	0	0	0	1	1	1	12	0	15
lbs. dogfeed	0	0	0	0	0	0	0	6	6	6	24	0	42
lbs. human food	0	0	0	0	0	0	0	0	0	0	40	0	40
Total weight	0	0	0	0	0	0	0	6	6	6	64	0	82
Arctic fox – number	0	0	0	0	31	32	34	20	30	53	0	0	200
lbs. dogfeed (Total)	0	0	0	0	120	110	70	40	45	75	0	0	460
Total weight – dogfeed	894	1030	576	165	206	152	165	119	152	211	313	644	4627
Total weight – human food	40	106	42	331	267	65	87	125	154	55	252	75	1599
Total weight – all food	934	1136	618	496	473	217	252	244	306	266	565	719	6226

Note: The number of seal, caribou, bear and fox are based on the means of recent harvests, with the monthly catch based on data for the years 1964-68 (except for seals which are based on the period 1964-67). The total and monthly harvests of birds, fish and hares have been estimated (ChapterTwo).The proportions used for dog-feed and human food have been estimated on the basis of field observations (in cases where the item is used exclusively by either dogs or men, this is noted in the above table by the notation "total" following the specified use). The calculation of weights is based on the conversion factors given in Appendix D, and attempts to take into account seasonal weight variation, seasonal variation in carcase use, and whether the item is being used by dogs or humans.

Source: Appendix D, field investigations.

TABLE B.2

Time expenditure by man-days for eighteen men involved
in full-time trapping activity, Banks Island.
1 July 1966 – 30 June 1967.

	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Total
Total possible man-days[a]	558	558	540	558	540	558	558	504	558	540	558	540	6570
Trapping	0	0	16	31	365	246	237	143	215	171	60	0	1484
(main lines)	(0)	(0)	(0)	(0)	(359)	(233)	(217)	(131)	(201)	(156)	(0)	(0)	(1297)
(day lines – short trips)	(0)	(0)	(0)	(0)	(6)	(13)	(20)	(12)	(14)	(3)	(0)	(0)	(68)
(pre or post season activity)	(0)	(0)	(16)	(31)	(0)	(0)	(0)	(0)	(0)	(12)	(60)	(0)	(119)
Seal hunting[b]	125	200	30	5	1	3	5	6	6	9	33	30	453
Caribou hunting	0	0	0	77	0	2	2	2	2	0	19	11	115
(hunting)	(0)	(0)	(0)	(77)	(0)	(2)	(0)	(2)	(0)	(0)	(16)	(5)	(102)
(hauling meat)	(0)	(0)	(0)	(0)	(0)	(0)	(2)	(0)	(2)	(0)	(3)	(6)	(13)
Bear hunting	0	0	1	0	0	0	0	0	0	1	0	0	2
Fishing	0	30	0	0	0	0	0	0	1	8	62	12	113
Wage employment	0	41	60	15	0	0	0	0	0	28	0	0	144
Away from the Island[c]	61	31	84	13	24	8	26	62	31	42	95	173	650

[a] Number of days in month times eighteen.

[b] Estimated for July to October.

[c] Visits for any purpose (including hospitalization) to other communities.

Source: Field investigations.

APPENDIX C

SOURCES AND METHODS FOR THE CALCULATION OF INPUTS AND EFFICIENCIES OF SEAL HUNTING

APPENDIX C

Sources and Methods for the Calculation of Inputs and Efficiencies of Seal Hunting

Participant observation and personal interviews were employed to obtain data on seal hunting. The analysis of relative efficiency is by season rather than by type of hunting, as in 1966-1967 conditions favoured floe edge hunting throughout most of the year. In Table C.1, inputs are calculated in two ways: per hunt and per seal retrieved.

Winter Hunting: There were thirteen separate hunts during the winter of 1966-67 (period 1 November – 15 April), all of the floe edge type, involving nine hunters who spent a total of twenty man-days on the ice. This does not include ventures that were unsuccessful due to the closing of the lead prior to the hunter's arrival, nor the few trips which involved the setting and checking of seal hooks. Data were obtained for all of the winter hunting trips by interview.

Spring Hunting: Data for spring (floe edge) hunting was gained through direct observations of two seal hunts in June 1965. There is very little supporting material as spring hunting was at a minimum in 1967. The figures given in Table C.1 are thought to be representative, although the true success rate might be somewhat lower. Information on fast ice hunting is insufficient to tabulate. It is probably the most efficient in terms of material costs (i.e. ammunition), but very time consuming – perhaps almost as much so as winter floe edge hunting.

Summer Hunting: The great majority of seals are taken at this time. Data were obtained from direct observation of four seal hunts in July and August 1966, plus post season interviews for that summer with the hunters, in which aggregate inputs and production were ascertained. This has provided a means of cross checking some data. The aggregate data on ammunition includes shells used for resighting, contests, birds and some open water hunting. The true ratio for summer floe edge hunting is probably close to the figure derived from the observational data. The aggregate data show a much higher and doubtless more accurate loss rate through sinking. The observational results are definitely atypical in this respect. However, the possibility of recovering sunken seals in summer is good under certain conditions. The sea water is quite clear and many areas within a mile or so from shore are not more than six or seven fathoms deep. There it is possible to recover seals with a small dragging hook. Those taking the precaution of hunting in shallow areas have been known to recover several hundred pounds of meat in this manner during a single hunt.

Both sources of information relate mainly to floe edge type hunting. Ice was present through most of the summer of 1966, and relatively few seals were shot directly from the canoes. Open water hunting is the least efficient in terms of ammunition and fuel, but ranks high in productivity per unit of time. The loss rate through sinking is probably somewhat less than in floe edge hunting, because with the boat already in the water and in motion, retrieval time is much shorter.

TABLE C.1

Inputs and efficiencies of seal hunting[a]

	Per Hunt			Summer Totals	Per Seal Retrieved			
	Winter[b]	Spring[c]	Summer[d]		Winter[b]	Spring[c]	Summer[d]	Summer[e]
Retrieved	1.4	9.5	3.5	963	1.0	1.0	1.0	1.0
Sunk	0.2	4.5	0.8	431	0.1	0.5	0.2	0.4
Hits	1.6	14.0	3.5	1332	1.1	1.5	1.0	1.4
Shots	n.d.	24.0	9.8	4200	n.d.	2.5	2.8	4.4
Number of seals shot at	n.d.	19.5	6.3	n.d.	n.d.	2.1	1.8	n.d.
Number of seals observed	1.8[g]	25.5	13.5	n.d.	1.4[g]	2.7	3.9	n.d.
Potential hunting time[f]	4:00	15:40	8:20	n.d.	2:51	1:39	2:23	n.d.
Travelling time[f]	2:00	0:30	2:10	n.d.	1:26	0:03	0:36	n.d.
Total time[f]	5:30	16:00	9:15	n.d.	3:56	1:41	2:38	n.d.
Gasolene (gals.)	nil	nil	n.d.	2000	nil	nil	n.d.	2.1
Oil (qts.)	nil	nil	n.d.	350	nil	nil	n.d.	0.36

[a]Includes ringed and bearded seals.

[b]Based on reports of thirteen hunts.

[c]Based on observations of two hunts.

[d]Based on observations of four hunts.

[e]Based on post-season interviews of sixteen hunters.

[f]Measured in hours and minutes. Potential hunting time includes time spent stationary in watch and also while travelling in open water or along the floe edge. Travelling time includes the latter plus travel to and from the settlement or camps, in areas where hunting is impossible. There is some overlap between potential hunting time and travelling time, so that the total of the two exceeds the figure for total hunt time.

[g]Approximate, possibly an underestimate.

n.d. – no data

APPENDIX D

COMPONENT WEIGHTS OF SELECTED SPECIES AND THEIR UTILIZATION, BANKS ISLAND, N.W.T.

APPENDIX D

Component Weights of Selected Species and their Utilization, Banks Island, N.W.T.

1. **Seals**

a. Ringed seals

Body weights were obtained for 74 ringed seals (34 males, 40 females) at Sachs Harbour, most during the late summer of 1966. Biological measurements of these seals are given by Usher and Church (1969:9). It is believed that the age class distribution of these seals was representative of the population as a whole. Carcase weights were obtained for 40 of the above seals (i.e. after the removal of the front flippers, the skin and some blubber, but not the viscera). These averaged 76 per cent of dead body weight, with little deviation during the summer season at least. Weight of bone and viscera are adapted from McLaren (1958:61).

total body weight	86.6 lbs
carcase weight	65.8 lbs
bone	14.0 lbs
viscera (not including kidneys) and other waste	13.0 lbs

Seals for winter use are stored and frozen uneviscerated. In spring and early summer, the viscera are removed due to rapid putrefaction. In the former case, the edible yield per seal (as dog feed) is 51.8 pounds, in the latter 38.8 pounds.

b. Bearded seals

Body measurements, sometimes incomplete, were obtained for 15 bearded seals. Eight body weights were recorded, and seven carcase weights, but only in two cases were both weights obtained for the same seal. Furthermore, the treatment of the carcase is not uniform. Sometimes it is skinned, like a ringed seal, in other cases only the viscera are removed. The situation was further complicated by the fact that in the summer of 1966, fully 63 per cent of the catch consisted of first year seals (versus 19 per cent for ringed seals). The hunters considered this remarkably high, but the normal ratio is not known. The average weight of seven young bearded seals was 202 pounds. Adults are known to reach 600 to 800 pounds. The average landed weight at Sachs Harbour, taking into account the appropriate portion of young seals, is unknown. However, in calculating meat yield in the present study, mean edible weight is taken at four to five times that of the ringed seal.

2. **Caribou**

Body weights were obtained for 13 caribou, of which ten were males. Two of the females were yearlings. There is thus an overrepresentation of fall caribou (viz.

Figure 2.6) and of males[1] which would tend to make the sample mean body weight greater than that of the population as a whole. However, fawns are also overrepresented, which would counterbalance this effect. The mean weights given below are therefore representative or nearly so. There is of course considerable variation by age and sex. Mean fall weight of three mature bulls was 213 pounds, and of five young bulls 170 pounds. One adult female weighed 149 pounds.

Bone weight is estimated at 25 per cent of total body weight according to Foote (1965:358). The head and legs account for 15 per cent of body weight in the Banks Island sample, leaving another ten per cent or slightly more of bone weight in the dressed carcase. Ledger and Smith (1964) found bone averaged about 15 per cent of dressed carcase weight in the Uganda kob, which leaves a marginally greater edible meat yield than Foote's index. The proportion of bone weight is probably very similar in all Cervidae.

body weight	160 lbs
head	11 lbs
legs	13 lbs
hide	9 lbs
inedible viscera	26 lbs
edible viscera	6 lbs
dressed carcase	95 lbs
edible carcase weight[a]	79 lbs
edible carcase weight[b]	81 lbs

[a] Foote index

[b] Ledger and Smith index

Mean edible yield per dressed carcase from the Banks Island sample may be taken at 80 pounds. This is in accord with White's estimate of 50 per cent edible yield for members of the deer and dog families based on meat packers' assessments of stock cattle (1953:397).

3. Polar Bears

Foote has estimated the average live weight of polar bears at 800 pounds, of which 75 per cent is edible blubber and meat (1965:353). Comparison of carcase weights to live weights of two winter bears at Sachs Harbour, adjusting for bone, suggests that the edible portion is about 70 per cent, in winter at least. Very few of the bears killed at Sachs in 1966-67 were full grown – more frequently they were in the 300 to 450 pound range. Foote's estimate is based on full grown animals, but seldom does the hunt yield animals solely in the upper age classes. Very possibly the mean weight of bears actually harvested is about 500 pounds, yielding 350 pounds of meat. If loss and wastage (due to inability to haul all the meat, and to the discarding of blubber scrapings from the hide) amounts to 25 per cent or more, the edible yield is probably 250 pounds per bear.

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[1] Information obtained for 280 of 306 caribou killed during the year 1966-67, showed that 180 were males one year and older, 69 were females one year and older, and 31 were fawns.

4. Birds

a. *Snow Geese*

Snow geese weigh four to six pounds (Manning, Hohn, and Macpherson, 1956:37). The edible component (mainly flesh) is probably about 70 per cent of live weight, for geese and other birds as well, according to White (1953:398)

b. *Eider Ducks*

Eider ducks weigh three to four pounds, of which about 2.5 pounds are edible (Manning, Hohn and Macpherson, 1956:47 and Foote, 1965:363)

c. *Ptarmigan*

Willow ptarmigan are about 1.5 pounds and rock ptarmigan about 1.0 pounds (Manning, Hohn and Macpherson, 1956:54-55).

d. *Owls*

The mean weight of seven owls taken in October 1966 was 5.1 pounds, of which about 80 per cent is suitable for dogfeed.

5. Fish

Although some very large fish are taken on Banks Island, the great majority of the catch ranges from two to four pounds. Edible weight is about 75 per cent of round weight (Brack and McIntosh, 1963:153).

6. Arctic Hare

Manning and Macpherson obtained a mean weight of 11.3 pounds for 11 adult hares in summer, but many of these were either pregnant or lactating (1958:9). The mean eviscerated weight of 36 hares taken at Castel Bay in April 1967 was 7.9 pounds. Live weight was probably between nine and ten pounds. Edible yield for humans is probably about five pounds, and somewhat more for dogs.

7. Arctic Fox

McEwen (1955:23) obtained a mean weight of 5.76 pounds for male foxes and 4.98 pounds for 170 female foxes, with a range of 3.5 to 11 pounds for the entire sample. However, other investigators have recorded foxes of over 20 pounds. McEwen considered his sample biased as it consisted of foxes taken in late winter when they tend to be lighter. White (1953:397) gives a mean weight of nine pounds. The edible portion for dogs is probably about 75 per cent live weight.

8. Wolves

The mean weight of six wolves recorded by McEwen in 1955 (1955:40) and one shot north of Storkerson Bay in April 1967 is 84 pounds. Edible weight is probably 40 to 45 pounds.

APPENDIX E

PRODUCTION COSTS OF COUNTRY PRODUCE

APPENDIX E

Production Costs of Country Produce

It is possible to calculate the cost of harvesting any type of animal, and accordingly, the production costs per pelt or per pound of food. These calculations are intricate and require several intermediate steps. They are based on the annual depreciation and operating costs of the stock of capital equipment, as given in Table 3.1. However, many of the separate items have more than one use, and the correct proportions of the costs must be assigned to each activity. Dog team travel must also be costed and proportionally assigned.

Table E.1 gives a breakdown of annual dog team travel and use. Table E.2 gives direct input costs per dog team, and allots costs to each activity on the basis of Table E.1. Table E.3 is a simple input-output matrix showing direct input costs for each activity. Table E.4 shows the costs per animal and per pound of each species harvested, and derives costs for dog feed and human food production.

It is necessary to carry the analysis further however, since some commodities are not produced for final demand but as intermediate inputs for other forms of production. The direct input costs of dogfeed must be reallocated, since dogfeed is itself an input to most types of hunting and trapping. Table E.2 showed only the direct input cost of dog travel. Table E.5 shows the true cost which is a combination of direct inputs and dogfeed production costs. (Costs of fox production have not been reallocated from Table E.5 since their use as dogfeed is only a secondary and incidental purpose of their harvesting.) In Tables E.6 and E.7, dogfeed production costs are added to the direct input costs of each of the major commodities produced. First, the cost per pound of seal, caribou and bear meat is calculated, then the cost per fox, bear and seal pelt. Bears and seals have been assigned a cost for both meat and pelts. Either cost can be used, depending on the primary manner of utilization, but not both simultaneously.

TABLE E.1

Approximate annual travel per dog team

Year	Trapping[a]	Caribou hunting	Bear hunting	Seal[b] hunting	Other[c]	Total
1964-65	965	120	80	100	200	1465
1965-66	1340	95	80	100	200	1815
1966-67	1080	105	0	50	200	1406
Adjusted means[d]	1130	110	80	100	200	1620
Proportion (per cent)	70	7	5	6	12	100

[a]Includes estimates for day lines.

[b]Estimated.

[c]Estimated; includes travel to camps, hauling gear or produce, hire of dog teams, settlement use, etc.

[d]Adjusted to probable long term average, ignoring unusual circumstances.

Source: Field investigations

TABLE E.2

Direct costs of dog team travel, per team (nine dogs) per year

a.	Direct inputs	
	cornmeal	$220.00
	naptha gas (37.5 gals.)	46.88
	harnesses	62.50
	dog line and chains	5.00
	total	$334.38
b.	Costs by type of use	
	trapping	$233.23
	caribou hunting	22.72
	bear hunting	16.50
	seal hunting	20.64
	other	41.29
	total	$334.38
c.	Cost per mile: 1620 miles at $334.38 = $.21	

Source: Tables 3.1, E.1.

TABLE E.3

Direct input costs by commodity, per year

Item	Fox	Seal	Caribou	Bear	Goose	Duck	Ptarmingan	Owl	Fish	Hare	Total
Traps	75.00										75.00
Rifles		58.33	20.00	9.17	15.88						103.38
Scopes		6.50	4.50	2.00							13.00
Ammunition		50.00	30.00	5.00	12.00	2.00	2.50	20.00		8.00	129.50
Canoe		100.00									100.00
Outboard		142.86									142.86
Gasolene		156.25							32.00		188.25
Outboard oil		33.00							8.00		41.00
Dogs	233.23	20.64	22.72	16.50					8.00		301.09
Toboggan and sled	25.82		5.00	3.57							34.39
Tent	30.00		7.00	3.00							40.00
Other gear	30.00	10.00	7.00	3.00							50.00
Naptha	25.00	6.25	4.50	1.75							37.50
Nets									12.00		12.00
Total	419.05	583.83	100.72	43.99	27.88	2.00	2.50	20.00	60.00	8.00	1267.97

Note: Costs assigned to commodities on the basis of known or estimated proportions of time, distance or amount of total input required to obtain that commodity. All depreciation costs have been assigned to the major commodities, with the minor ones bearing only direct maintenance costs. Minor differences in calculation account for slight discrepancies which may appear between the figures presented here and in Table 7.1.

Source: Tables 3.1, E.2.

TABLE E.4

Annual food production costs, by weight

Type	Number	Direct input cost per animal	Cost per lb.	Dogfeed Weight	Dogfeed Cost	Human Food Weight	Human Food Cost	Total Food Weight	Total Food Cost
Seal	80	$ 7.30	$.16	3638	$574.23	60	$ 9.60	3698	$583.83
Caribou	15	6.71	.08	30	2.40	1170	98.32	1200	100.72
Bear	1.5	29.33	.11	361	39.59	40	4.40	401	43.99
Goose	30	.93	.27	0	.00	105	27.88	105	27.88
Duck	15	.13	.05	20	1.02	19	.98	39	2.00
Ptarmigan	60	.04	.05	0	.00	54	2.50	54	2.50
Owl	20	1.00	.25	76	19.00	4	1.00	80	20.00
Fish	55	1.09	.58	0	.00	107	60.00	107	60.00
Hare	15	.53	.10	42	4.10	40	3.90	82	8.00
Fox	200	2.10	.91	460	419.05	0	.00	460	419.05
Totals or means:									
including foxes			$.20	4627	$1059.39	1599	$208.58	6226	$1267.97
excluding foxes			$.15	4167	$640.34	1599	$208.58	5766	$848.92

	including foxes	excluding foxes
Cost per lb., dogfeed	$.23	$.15
Cost per lb., human food	$.13	$.13

Source: Tables 2.8, E.3.

TABLE E.5

Total costs of dog team travel, per team (nine dogs) per year

a. Costs by type of use

	Direct inputs	Dogfeed production	Total
Trapping	$233.23	$448.24	$681.47
Caribou hunting	22.72	44.82	67.54
Bear hunting	16.50	32.02	48.52
Seal hunting	20.64	38.42	59.06
Other	41.29	76.84	118.13
Total	$334.38	$640.34	$974.72

b. Cost per mile: 1620 miles at $974.72 = $.60

Source: Tables E.2, E.4.

TABLE E.6

Production costs of seal, caribou and bear meat (adjusted)

	Seal	Caribou	Bear
Number obtained	80	15	1.5
Basic production cost (Table F.3)	$583.83	$100.72	$ 43.99
Dog feed production cost (Table F.5)	38.42	44.82	32.02
Total cost	622.25	145.54	76.01
Cost per animal	7.78	9.70	50.67
Cost per lb.	.17	.12	.19

Source: Tables E.4, E.5.

TABLE E.7

Production costs per saleable pelt

	Fox	Bear	Seal
Number obtained	200	1.5	60
Direct input costs	$419.05	$ 43.99	$536.38[a]
Dogfeed production costs	448.24	32.02	12.50
Total costs	867.29	76.01	548.88
Cost per pelt	4.34	50.67	9.15

[a]Adjusted to exclude spring sealing, when most unsaleable pelts are taken.

Source: Tables E.4, E.5.

APPENDIX F

IMPORTED FOODSTUFFS

APPENDIX F

Imported Foodstuffs

TABLE F.1

Weight of foodstuffs imported by a typical family of five, for one year, Sachs Harbour, N.W.T.

Item	Weight (lbs.)
Flour	500
Sugar	300
Dry milk	100
Evaporated milk	250
Cereal	50
Miscellaneous baking goods	100
Dehydrated foods (inc. rice, macaroni, spaghetti, potatoes, etc.)	150
Biscuits and cookies	150
Lard	100
Butter	100
Jams & spreads	50
Tea	25
Coffee	50
Soups (mostly dehydrated)	50
Tinned meat	200
Tinned vegetables	150
Tinned fruit	350
Tinned juice	100
Fresh produce (chiefly eggs, onions, cheese)	100
Miscellaneous (raisins, candy, etc.)	50

The above weights represent combinations of round, semi-evaporated and dry weights. A breakdown according to major food categories would therefore be misleading. The proportion of carbohydrates is high, but imported food is supplemented by about 1,600 pounds of locally obtained meat and fat, so that in fact protein foods form a considerable proportion of the whole.

The annual purchase of carbohydrates, fats and dairy produce is relatively inflexible. Breadstuffs and spreads are an important food item at home and on the trail. There is greater variation in the purchase of tinned produce according to taste and economic circumstances, as these are more of a luxury. The above "normal" amounts will certainly be reduced in times of economic stress. Tinned meat, for example, which is most heavily consumed in summer when the country meat supply is low, is relatively expensive. It is one of the first items to be foregone when money is short. Paradoxically, the poorer the family, the greater will fresh meat figure in their diet.

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[1]This bibliography is divided into two sections. The first is a list of works referred to in the text. The second is a list of additional sources which have been of assistance but are not specifically cited. It is not a comprehensive bibliography of any particular place or subject.

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